The Chemical Age
A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XXIX. July 8, 1933 No. 732

AN index to Volume XXVIII of THE CHEMICAL AGE is published with this issue. It will be found inside the back cover whence it can readily be detached for binding purposes.

Notes and Comments

Conference and Confidence

WHATEVER may be the passing political reactions at the collapse of the World Economic Conference, or whether the conference actually ends or is merely adjourned, or carries on for a time in some other way, a deep refreshing undercurrent of relief will bring comfort to the business world. Trade is at its lowest level and is showing a tendency to improve. The lowest level has been reached not only because of barriers, prohibitions and political impediments of every sort, but also, and perhaps chiefly, by the latest fashion for artificial political prices. If a price is high or low the business man can deal with it provided that it is a real price. But an artificial price arranged by Act of Parliament, or even by a World Conference, can never be a basis for serious business. All this talk about stabilisation by politicians has done more to embarrass the great business world than any political stunt in history. President Roosevelt is too young in his office to have acquired a reliable character, but in squashing this notion of a World Conference price, he has earned the gratitude of all natural minded people. The wholly artificial and confidence-destroying nature of this political planning of our economic lives was never better illustrated than in this conference, with its suggestion that sixty-six nations could be manoeuvred into believing that their delegates could impose an arbitrary rate of exchange upon the world. To stabilise the dollar, with a heavy deficit on the American budget, with grave risk of inflation, with war debts still unsettled, would have been to reduce the whole machinery of money to a tragic and useless farce. The end of the idea will, therefore, help along the welcome trade improvement, of which there are already signs.

The Purpose of Work

FROM amid the weltei of conflicting ideas concerning the future well-being of the world and the best way of encompassing it there has arisen a point of peculiar importance to chemists and perhaps even more so to chemical engineers. This topic may be crystallised in the question: " What is the purpose of work? " Not many years since, there would have been one answer only to this question. Work was performed for the purpose of making goods for consumption or for the use and enjoyment of mankind. The early craftsmen delighted in the delicate art of making beautiful articles, some of which are treasured to this day for their artistic merit and exquisite craftsmanship. The growth of the population during the nineteenth century coupled wih the introduction of the machine led to emphasis being placed on *consumption*, beauty being little accounted of in the days of Victoria. During that era of expansion, which has been described as the best period in the history of the world in which to have lived, the growth of the machine, of consumption and of the boundaries of the civilised world resulted in a vast increase of wealth.

The greater the production the greater the wealth. Naturally the machine at first encountered opposition, but when it was realised that the cheapening of production resulted in greater consumption and in plenty of work for the men temporarily displaced by the machine, all opposition died down and the whole nation set to work to produce more and more in order to increase wealth. The economists set up the theory that cheapening of production creates work and wealth, a theory that seemed to be proved by the experiment of experience. A successful theory is no more than a hitherto unshaken explanation of observed facts. We are beginning to wonder whether the theories of the economists have any more permanence, however pontifically they may be expressed, than some of the theories propounded in the past by scientists. Be that as it may, the nineteenth century held that the purpose of work was the production of goods. As a natural corollary it was maintained that cheapness in production was equally important, since experience then showed that every labour-saving and cost-saving device increased the amount of labour employed and enhanced the general welfare of the whole population. *The production of goods*, therefore, was considered to be the purpose of work, and no economist ventured to suggest that the primary duty of an employer was to give employment.

Creation of Employment

WHEN we read that men fought in the gutter for crusts after the Crimean war, we may perhaps be pardoned for a fleeting doubt whether the economic theory was not cold and abstract rather than vital and humane. Perhaps the first real evidence of change was the Unemployment Insurance Act, wherein it was recognised by the State that employers had a duty to those men for whom they could not find employment. From that time onward the change has been rapid. In the few years that have passed since that Act was put on the Statute book there has been an almost complete *volte face*, if not of economic theory, certainly of general opinion. It is now held consciously or sub-

consciously that the purpose of work is to bring employment. With the announcement of every large order there is the parallel statement of how many men will be employed in performing the work and for how long. It has been well suggested that if an employer who received a large order announced simultaneously that by making readjustments in his plant he would be able to complete the work without engaging any more men, he would be an object of execration rather than of praise. The products of the chemical works, of the engineering workshop, of the loom, are no longer measured by the value of the goods or services to the community whether immediate or ultimate, but by the number of persons who receive wages or salaries as the result of their manufacture. It follows as a Euclidean corollary that the greater the wages cost the more valuable is the work, and, by the same inversion of Victorian economics, the less its efficiency the greater is the value of a factory to the community. If the present popular appraisement of the value and purpose of work is correct it becomes axiomatic that we as chemists and engineers must immediately cease our quest for increased efficiency and must adopt a new standard quite at variance with those of the school in which we have been trained. Blessed is the man who can burn two tons of coal where but one was burnt before! Blessed is the man who uses double the necessary quantity of caustic soda for washing out his tar acids! *O sancta simplicitas*!

The Quest for Lower Costs

WE can never abate our quest for lower costs whatever may be the ultimate result. Even if we should deem it desirable so to waste the natural resources of the earth, competition would not allow it. It is recorded of one of the earlier types of pumping engines that it alone succeeded in freeing the deeper mines from water and in making them workable, but that in so doing it used so much coal that the whole profits of the mines were used up in keeping the pumping engine at work. The least diminution in efficiency in any one factory or in the workshops of any one nation to-day would immediately lead to a parallel result. Commercially the race is to the efficient rather than to the strong; victory is won by the man who uses 100 h.p. engine to do 100 h.p. of work, and not to the one who installs a 1,000 h.p. engine for the same purpose. From the view-point of the engineer or the chemical engineer the issue is clear. He must continue his search for efficiency and for ever greater efficiency until the Bolshevics of the world arise and send him to their own particular version of Siberia as an "enemy of the workers." The chemist, however, has other duties which do not stop there. Unlike the engineer his work is not alone the pursuit of efficiency; he is also the creative force of industry that invents new products and new uses. He is the progenitor of new industries.

The Procession of the Ages

WE have paid a visit to the exhibition of British Industrial Art at Dorland House. We came away wondering what age we are in. Mankind, according to his knowledge and his degree of skill, has passed successively through the Stone Age, the Bronze Age, to the Iron Age. We are supposed to be in the Iron Age now. According to one of our contemporaries, however, we have just emerged from a Wood Age extending through the reigns of Tudors, the Stewarts and the Hanoverians and are now in the New Stone Age. At Dorland House there is a stone dining room. The floor, the walls and the furniture are of stone, and so are the ornaments and many of the table utensils. There is however a glass room, and so on. It would also be possible—and upon surer grounds—to deem ourselves as living in a Steel Age. America, particularly, prides herself upon steel furniture, steel ornaments, steel buildings and steel fittings for every conceivable purpose. We have lately called attention to a synthetic home constructed in New York City in which vinyl resins have been used for the construction of virtually every part of a three-roomed residence. Are we then issuing from a brief Steel Age into a Plastic Age? When we think of the eons through which the Bronze Age and Stone Age stretched, let us be chary of dignifying any epoch of less than a thousand years by the title of an Age. What "Age" is likely to extend through the next thousand years? Products come and go; product supplants product to be in turn supplanted by a newer manufacture; commercial competition is restless as the sea, ever changing, ever new, ever unsatisfied—but always essentially the same. It is in that sameness that we may label our age.

What is the common denominator of all these changes? Surely that under them, and controlling them, and initiating them is the work of the scientist. Cannot we say with some certainty that we are in the "Scientific Age"? Why should an age be classified only by what it uses to build with and to make its tools and weapons? Surely what it eats and the way it lives are equally important. Judged from whatever angle one will, the work of the scientist is alone ubiquitous. Our food, our amusements, our clothes, our work, our daily habits—none of these is controlled by steel alone, by stone alone, by glass alone, by plastics alone; all are controlled by the discoveries of science.

Secrecy

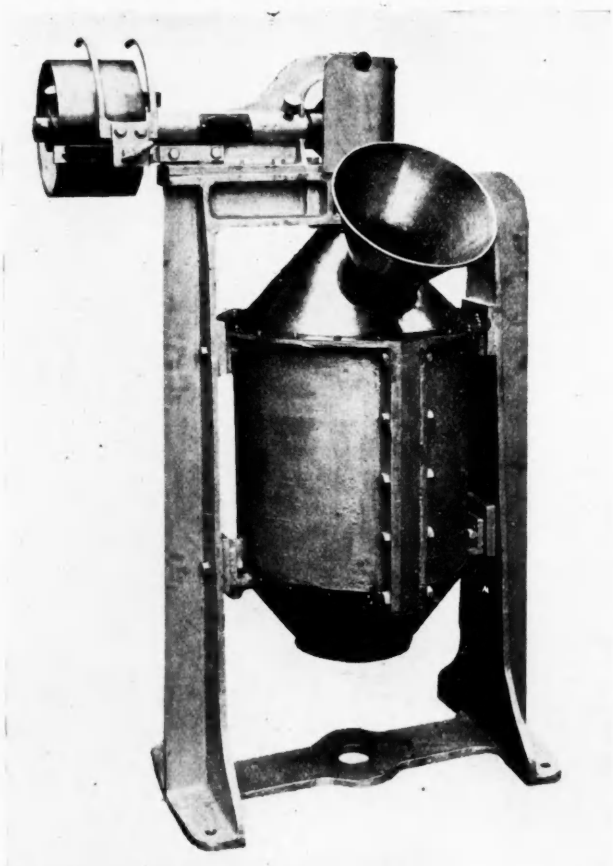
THERE are some concerns which refuse to grant publicity concerning their manufacturing activities. Their plant operations are hidden behind a veil of great secrecy, and progressive developments are sometimes the poorer for this state of affairs. But eventually there comes a day when the great secret is merely common knowledge, for once it has been laid bare it travels through the industry like the flames of a prairie fire. In some things the world cares but little about what you do until you make a mystery of it. Then it is that half-a-score of cleverer fellows will make it their purpose to keep close upon your heels and watch you continuously, until they are able to announce your doing to the world. They may sing your praise loudly if it is worth singing, but when occasion arises they may turn publicity agents to your own disadvantage. Why not invite them into the works and let them spend half-an-hour with the steam pipes and the rumble and clatter of the grinding mills; you might even let them have a glimpse of the conveyor—where it handles the packing cases! After all there is plenty to be seen, without mentioning the essential secret parts of the plant. Your worst rival may turn a useful friend at an unexpected turn of events.

Food Manufacturing Equipment

Extended Use of Pure Nickel

THE value of nickel to the food manufacturing industry is being repeatedly proved by many manufacturers. It is chiefly useful because of its combination of properties. It has a high tensile strength and a toughness greater than that of mild steel. The surface of nickel sheet, moreover, is smooth and exceptionally hard, so that it is highly resistant to scratching and quite easy to clean. It cannot be damaged by abrasion; cleansers which could not be used on softer metals or coated materials can be used on nickel without the slightest danger. The resistance of nickel to the corrosive action of acids is also remarkably good, particularly so in the case of acids encountered in the food manufacturing industries, and to all alkalies. For all materials required for use in contact with foods, non-toxic properties are essential. The combination of good physical and corrosion-resisting properties is therefore the basis of the service given by nickel and explains why nickel equipment assures low maintenance costs to the user.

Chopping and pulping are operations which are widely employed in the canning industry. Such products as apples, cabbage and other vegetables are put through chopping machines in the preliminary stages of treatment, while pulpers are employed for removing pips, stalks, stones and seeds from all kinds of fruit. Nickel is employed for hoppers, interior bodywork and sieves, so that the fruit comes in contact with no other material but nickel during processing. Nickel castings are also required in the construction of these machines. For brining operations the use of nickel equipment has definite value. Nickel tanks and coils are used in connection with the brining of peas, and have eliminated trouble with "flat sours," formerly experienced with wooden equipment.



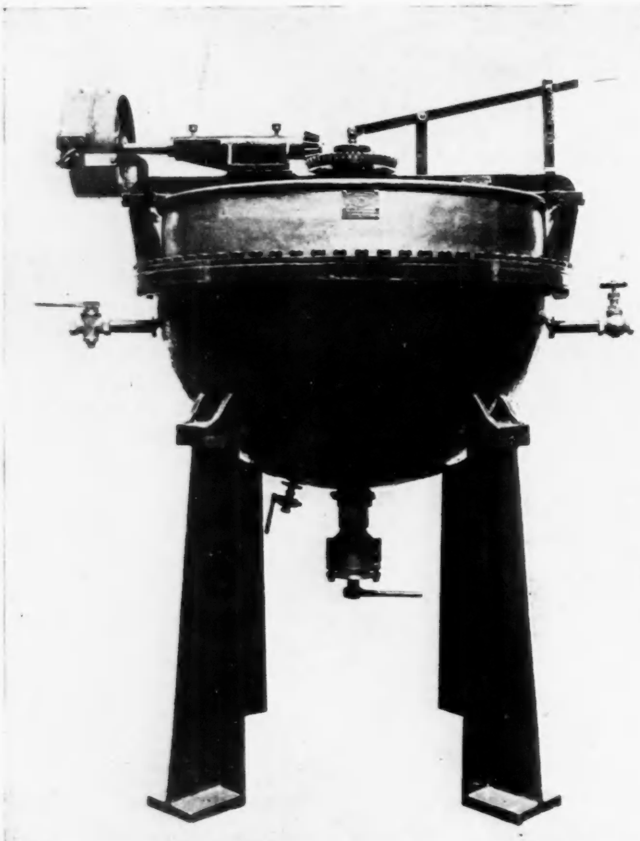
A Fruit Chopper with Hopper, Chamber, Blades and all Contacting Parts of Nickel. (Wm. Brierley, Collier and Hartley, Ltd.)

Wood, owing to its porosity, is an ideal breeding ground for objectionable bacteria. In refrigeration systems, also, pure nickel is used, notably for ice cells for making ice blocks. It fulfils the requirements of this service admirably, as it is not affected by ammonia or brine solutions and hence repairs are practically eliminated and long life secured.

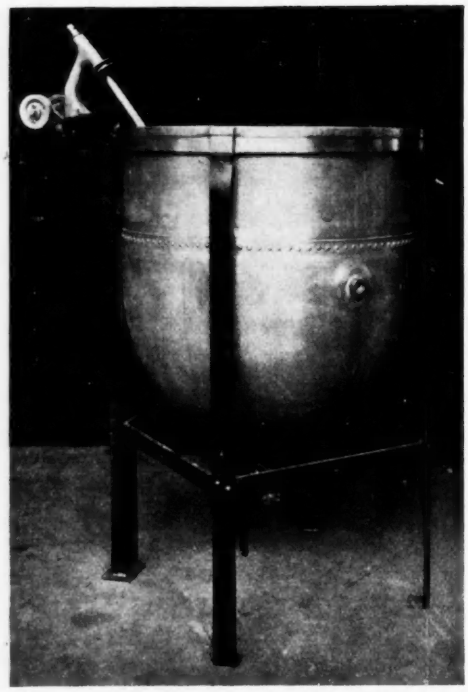
Brining Tanks with draw-off Pipes and Valves made entirely from Malleable Nickel. (Wm. Brierley, Collier and Hartley, Ltd.)

Emulsifying is another good manufacturing process which is widely employed, notably for reconstituting milk from milk powder. Confectioners and caterers use emulsors for this purpose, and numerous installations are to be found on ocean-going ships and in ice cream factories, hotels, restaurants and hospitals. Milk, cream and ice cream are all produced by emulsifying. Malleable nickel equipment meets all requirements for emulsifying apparatus, and is used for those parts with which the product comes in contact, chiefly tanks, tank covers and feeding apertures. The brine cooling equipment, which is an essential part of an emulsifying unit, is also made from nickel.

Mixing equipment is used in connection with solids, pastes and liquids, and may be carried out under high positive pressure, *in vacuo* or in ordinary tanks, with either portable or fixed mixers. In both types of equipment nickel is employed for shafts, propellers and stirring gear. The strength and toughness of the metal permit comparatively thin sections to be used for stirring gear, allowing larger quantities to be treated in each operation, whilst the metal also enables rapid and thorough cleansing to be done so that the equipment can be used almost continuously. Non-contamination of product is of importance, particularly in the processing of fruit juices or in the preparation of syrups for bottled carbonic acid gas beverages to avoid spoilage. The prevention of decolourising and an off-taste being given to the product are additional advantages which accrue to the user of nickel equipment.



A Mixing Machine fitted with Nickel Parts. (Wm. Brierley Collier and Hartley, Ltd.)



Above : Nickel Kettle fitted with Mixing Device in Nickel. (The Aluminium Plant and Vessel Co., Ltd.)

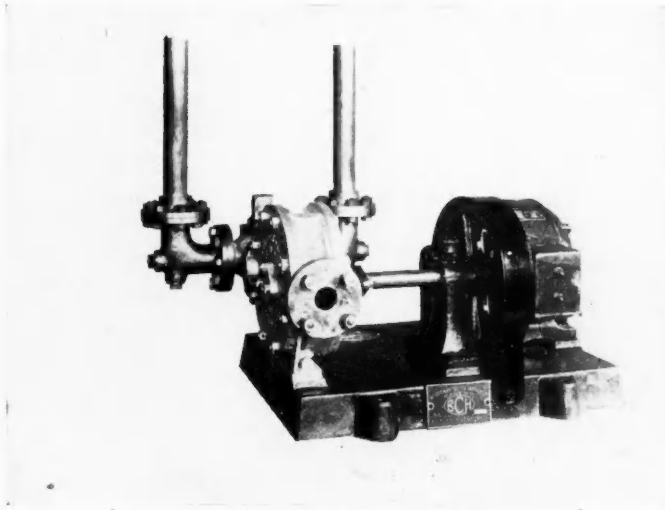
Below : Vacuum Plant in Nickel for the Processing of Tomatoes. (Wm. Brierley, Collier and Hartley, Ltd.)

Mixing and stirring equipment made from nickel is employed in plants handling gelatine, and various types of fruit juices, including apple juice.

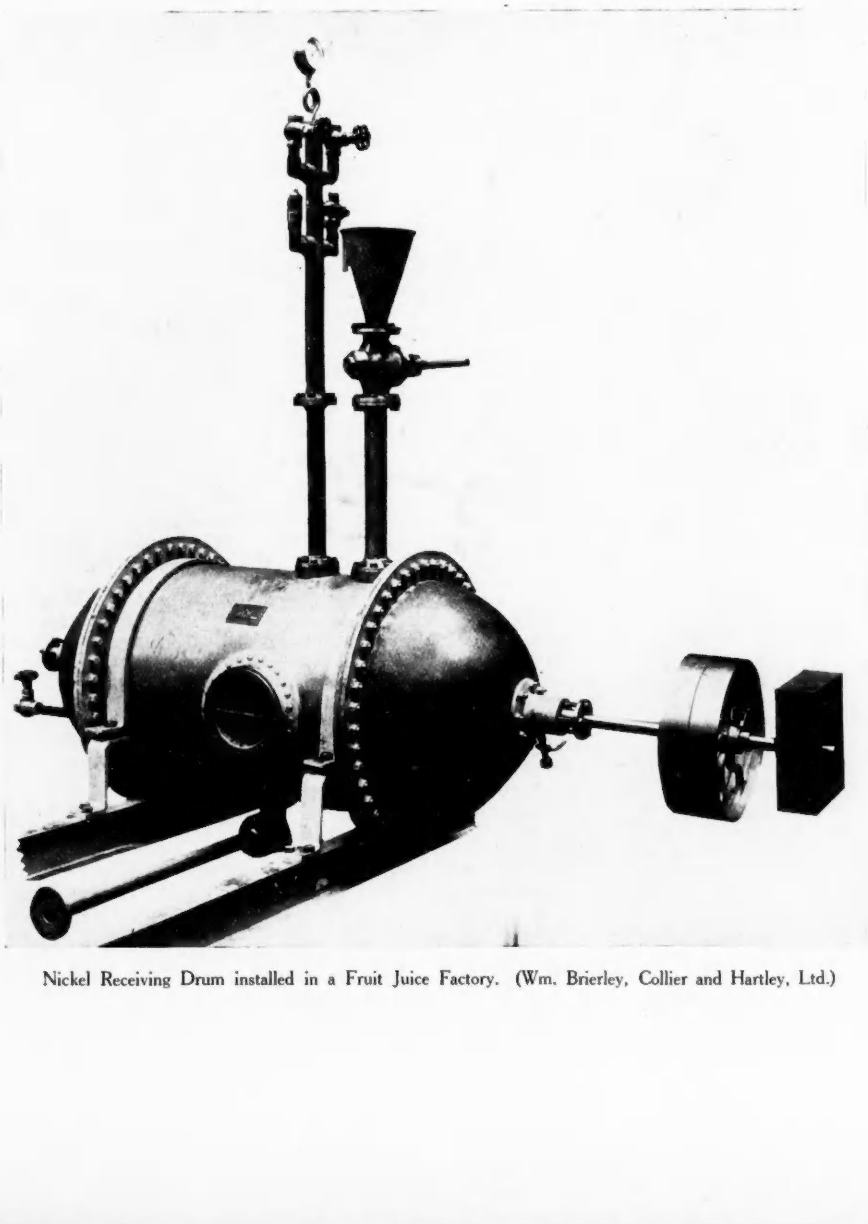
Boiling under pressure is now extensively practised in the food product industries, mainly because of the saving in fuel and time which the process permits. The preparation of fruit for pulping, the preliminary treatment of fruit juices and the dissolving of sugar for syrup are all carried out in this way, the vessels in which the operations are conducted being termed autoclaves. The product after treatment may be removed by compressed air. Quantities of from one to two tons can be handled in one operation. Nickel is employed for autoclaves on a large scale, since its strength and toughness enable it to withstand the high steam and air pressures involved. The former are generally in the neighbourhood of 80 lb. to 100 lb. per sq. in., but far higher pressures have been obtained on test; air pressures are usually about 58 lb. per sq. in. Resistance to corrosion is also required in many instances, particularly with certain fruit juices, the corrosive action of which is notoriously severe.

Nickel has also been used by food manufacturers and canners for jacketed and plain kettles employed for bulk cooking. This service is usually severe, especially in jacketed kettles where high steam pressures are employed. High tensile strength and corrosion resistance are essentials, for the products handled are often of an acid character and working steam pressures of 100 lb. per sq. in. or more are used. Non-contamination of the product is an absolute essential, and to ensure a sterile surface the metal employed must be free from the danger of pitting. Nickel is eminently

Nickel Kettle fitted with Nickel Steam Coil. (Wm. Brierley, Collier and Hartley, Ltd.)



Pump for Fruit Juices with Nickel Chamber and Rotor. (Wm. Brierley, Collier and Hartley, Ltd.)



Nickel Receiving Drum installed in a Fruit Juice Factory. (Wm. Brierley, Collier and Hartley, Ltd.)

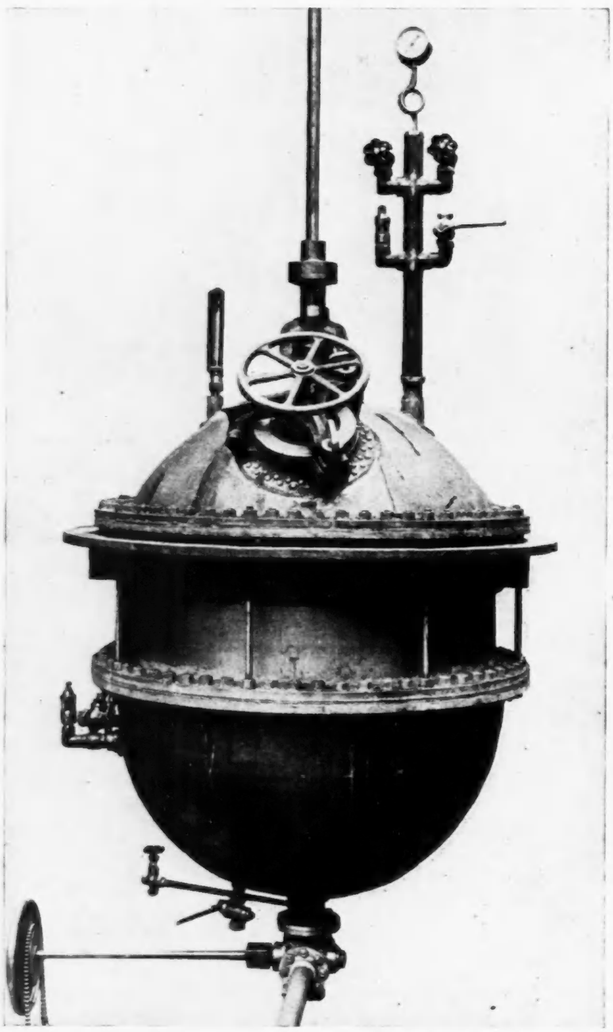
COIL HEATING.—The top left hand picture shows a novel arrangement of steam coils in a nickel kettle. A great advantage of malleable nickel is that it can be produced in tubes which can easily be coiled, and fittings for pipe lines can readily be produced. Nickel coils are extensively used in the preparation of foodstuffs and beverages.

CONVEYING.—Liquids are now generally conveyed through pipes, either by gravity flow or by pumping, and the top right hand illustration shows a typical pump for this purpose. Pumps made from nickel are used in connection with conveying operations in dairies.

FRUIT JUICE PROCESSING.—The illustration on the left is a typical example of nickel plant employed in fruit juice processing. The rapid expansion of the fruit preserving industry in recent years has involved the use of a large amount of nickel equipment.

suitable for this service, for its dense, hard surface, together with its smooth finish, render the removal of any accumulated deposit or incrustation a relatively easy matter. Strong alkaline and abrasive cleaners can be safely employed when nickel is used.

One great advantage of malleable nickel is that it can be produced in tubes which can be easily coiled, and all fittings for pipe lines can be readily produced in this metal. Such coils maintain a clean and smooth surface and may be used with perfect safety in contact with practically all food acids; they are extensively used with syrups, brines, fruit juices, milk, soups, tomato products, jams, jellies and beverages. The efficiency of heat exchange apparatus does not depend



An Autoclave made entirely from Nickel. (Wm. Brierley, Collier and Hartley, Ltd.)

solely on the thermal conductivity of the material used in construction. An important factor is the resistance offered by gas, liquids and solid films on the metal surfaces. A surface which will keep clean is, other things being equal, a better conductor of heat than one which becomes coated with a corrosive product. Nickel equipment has a heat exchange efficiency close to that of copper equipment.

Filtering, straining and clarifying are essential operations in the processing of a wide variety of foodstuffs. Corrosion resistance is the important requirement for materials used in equipment for performing these operations, maintenance of the purity of the product being the first essential. Simple gravity filters are employed, the container having a false bottom and filter cloth backed with heavy wire screen or perforated plate; many types of rotary and continuous filters are also in use, and frequently the entire filter drum and tanks are required to be made from non-corrosive materials. Filter cloth for any type of filtering machine may be obtained in nickel, ranging from coarse to as fine as 600 meshes to the inch.

The rapid expansion of the fruit-preserving industry within the last few years has involved the use of a large amount of nickel equipment, because experience has shown that citric, malic, and other fruit acids may be used in contact with nickel without harmful effect. No appreciable decolourising effect on fruit juices is experienced when nickel equipment is employed. Complete installations have been furnished in nickel, while the fruit industry also uses malleable nickel equipment for auxiliary apparatus, including hoppers, sinks, conveyors, extraction and clarification apparatus, filter cloth and stills.

There are also many operations in the food industry which are carried out under vacuum, the processing at low temperatures aiding in maintaining the flavour of the product. The vacuum evaporation of fruit juices, tomato pulp, infant foods and gelatine are typical examples of this work. Nickel stills are employed in processing fruit juices, where a pure product is absolutely essential. Whole batches of fruit may be ruined by the slightest contamination, and as a rule the discovery of the spoilage is not made until the product is on the shelves of the retailer. Nickel is therefore used to safeguard the reputation of the maker of trade-marked products, in addition to preventing actual losses in production and in the replacement of returns. These stills are generally of spherical shape and may be produced in one piece. Cold drawn seamless nickel tubes are used to connect the still with the condensing apparatus, an outlet pipe of decreasing diameter being employed.

Monel Metal for Bolts

Superior Corrosion-Resisting Qualities

THE value of Monel metal as a bolt material is the subject of a brochure issued by Henry Wiggin and Co., Ltd., According to this brochure the strength, ductility and corrosion resistance of Monel metal is far superior to other non-ferrous materials and to carbon steel as used for bolts.

Since the overstressing of bolts is a fairly common occurrence, a high ductility is a better assurance against breakage than a high strength. For that reason a bolt with high ductility and moderate to low strength may be more desirable than one of moderate ductility and moderate to high strength. A bolt possessing a tensile strength of 36 tons per square inch with an elongation of 30 per cent. in two inches is distinctly more serviceable than one having the same strength with an elongation of only 17 per cent. Tests have shown that in the range of sufficiently ductile material, the strength of Monel metal is higher even than that of a typical high strength alloy steel while the strength and elongation are both superior to those of a typical low-carbon steel.

Corrosive Influences

Moist atmosphere is not the only corrosive influence to which bolts may be subject. Another of importance, for instance, is that which results from the acid conditions in steel-pickling equipment. In such conditions the higher strength properties and the better corrosion resistance of Monel metal combine to give it an advantage, either in longer life or in a greater safety factor, depending on the circumstances. This is equally true, of course, for corrosive conditions of any other type. The fields where the corrosion-resistance of Monel metal is of greatest importance are those where exposure is caused by acids, alkalies, food products, salt solutions, the atmosphere, water, and organic compounds. The corrosive influence of the atmosphere varies with the moisture content, sulphur gases, sea salt and other factors. Thus the type and degree of attack which result from exposure of metals in the highly sulphurous atmosphere near the roof of a railway engine shed may be quite different from those which result from the action of a rural atmosphere. Monel metal is highly resistant to all such conditions, the rate of attack, even in severe urban conditions, being as low as 0.00018—0.00035 inch per year.

Alkali Manufacture in Great Britain in 1932

Annual Report of the Chief Inspector

MR. W. A. DAMON, chief inspector under the Alkali, Etc., Works Regulation Act and Alkali Works Order, has issued the sixty-ninth annual report on the work of his Department covering the year 1932. The report states that the number of works registered in 1932 was 921, which involved the operation of 1,720 separate processes. There was a reduction since the previous year of 63 in the number of works and 73 in the number of separate processes. The most substantial decreases have been in the number of works registered for the manufacture of sulphate of ammonia and for tar distillation, but to an extent this has been offset by an increase in the number of benzene works. The number of visits by district inspectors during the course of the year was 4,088 and in connection with these visits of inspection, 1,980 quantitative analyses were made of chimney and other gases escaping into the atmosphere from the processes in operation. Every registered works has been visited at least once. In addition to routine visits of inspection, it has been found that, year by year, an increasing amount of time has to be devoted to the investigation of complaints against works not on the register and to making other inquiries.

Improvement in Chemical Trade

Mr. Damon remarks in his report that the year was noteworthy for a change in the fiscal policy of the country. Conditions in the chemical trade though still far below normal have been on the whole better than in the previous year. The imposition of tariffs on imported chemicals has helped the manufacturer and, in some cases, combined with the influence of the exchange value of sterling, it has offered him an export market. There has been some improvements in the iron and steel trade which has resulted in an increased demand for coke. There is reason to hope that the improvement will be sustained, in which case the chemical industry will soon derive some benefit. Generally speaking one is impressed by the way in which in spite of trading difficulties British undertakings continue to modernise plant and improve their efficiency. There is satisfaction, too, in the prevalence of an optimistic feeling that the economic state of the country has reached its lowest level and is now on the up grade.

The production of cement has again been considerably restricted and a number of works have been closed. One new works has, however, been started on the south coast. The situation regarding emission of dust from cement works is possibly not so acute, but much complaint continues to be made. This is generally directed against the larger works, but in fairness it must be admitted that these larger factories are doing good pioneer work and are the most active in attempting remedial measures. Dust emission increases with output and a more efficient dust extraction is necessary in the case of a big works than in the case of a smaller one.

Spray feeding has been altogether abandoned, the only two works which practised this method having now reverted to spoon feeding. This, together with chaining of the kiln and enlargement of the dust chamber, has resulted in the virtual cessation of complaints against a works which, while spray feeding was practised, was never free from trouble.

Smelting Works

The prices of zinc and tin in particular fluctuated considerably during the year, reaching a minimum in April and a maximum in September. As a consequence, smelting operations have been irregular. One new works was registered. This was in respect of the treatment of partially roasted pyrites in a sintering machine. Such tests as have already been carried out indicate that the highest acidity of the flue gases is reached within five minutes of the commencement of the operation, afterwards falling quickly to a low figure. The average of all tests made on exit gases showed a concentration of 2.62 grains (as sulphur trioxide) per cu. ft. The corresponding figure for 1931 was 3.03 grains.

Zinc blende has been treated chiefly in sintering machines, all the acid fume evolved being converted into sulphuric acid by the contact process. No effective measures have yet been developed for trapping the zinc fumes which escape from the retorts and which, when discharged from low chimneys appear as a fog. The roasting of galena is effected in Scotch hearths, Newnham furnaces, sintering machines and blast furnaces, or a combination of these. At one works lead fume is deposited by a Lodge-Cottrell precipitator; at another extensive dust chambers followed by cyclones are considered to be sufficient. By careful control the acidity of the exit gases can be kept down to a figure of about 3.0 grains as sulphur trioxide per cu. ft., which is reasonably satisfactory.

Three tin mining companies have operated throughout the year, together with the several streaming companies which extract from the waste mineral waters. This is a slight improvement compared with last year. The acidity and the arsenic content of the escaping gases have been satisfactory. The Mond Nickel Co., Ltd., has replaced its old calciners by others of modern design which, it is thought, will result in less low-level escape of acid gases.

Sulphuric Acid Works

A substantially greater amount of sulphuric acid was produced in 1932 than in the previous year. The comparison is made, however, with a year when conditions were extraordinarily bad, so that even now only about 60 per cent. of the capacity of the available plant is in use. A number of extensive repairs and replacements of towers and chambers have been effected. The inspectors have had on several occasions to call attention to worn leadwork, and there are still instances where further repairs are urgently required. There have been a number of cases where the inspector has found acidity of exit gases in excess of the statutory limit. All these received immediate attention. In several cases, the high escapes were attributed to an abnormally high ammonia content in the spent oxide. Such oxides are prejudicial to good working of a chamber plant unless control is such as will enable a change of conditions to be forestalled. It has, in fact, been noticeable that, in cases where, for various reasons, chemical control has been diminished, greater variations in tests have been obtained.

Concentration plants have been maintained in good condition. There is no difficulty in keeping the acidity of escaping gases well below the statutory limit. Estimations of the efficiency of condensers and scrubbers are valuable and should be made at regular intervals. A plant for the manufacture of sulphuric acid by the contact process by the roasting of anhydrite, whereby cement clinker is also produced, is now operating successfully on a commercial scale at the Billingham works of I.C.I. (Fertilisers and Synthetic Products), Ltd. The gases are caused to pass up a tower packed with rings which is irrigated by a solution of ammonium sulphate and 25 per cent. ammonia. This liquor is circulated until a definite strength of bisulphite is attained, when it is pumped over to a lead lined vessel and acidified with sulphuric acid. The sulphur dioxide, which is driven off, returns to the contact plant and the residual sulphate liquor goes forward to the sulphate department. At first there was considerable entrainment of ammonium sulphate spray to atmosphere, but this has now been avoided by the provision of a second tower, which is kept dry and which acts as a spray arrestor. By the employment of this means, the acidity of the escape can be reduced readily to about 0.5 grain as sulphur trioxide per cu. ft. One complaint of sulphurous fume was traced to an oleum plant. In this case, a failure of the electric power supply had resulted in a temporary stoppage of the fans and considerable low level escape had occurred before the plant could again be got under control.

Chemical Manure Works

In the South of England there appears to have been some improvement in the state of the superphosphate industry; no such improvement, however, is apparent in other districts. In general the larger works are continuing to make superphosphate, but the smaller ones find it more economical to purchase such supplies as are required for incorporation in the various compound fertilisers. Manufacturing practice is tending towards the production of a drier and more free run-

ning material. Several continuously operated dens of the Broadfield type have been installed and, so far, these have given satisfaction and have been successful in producing superphosphate of good quality. Washers for the gases have been well maintained and no case of unsatisfactory condensation has been noted. The average of all tests made showed that the total acidity of escaping gases was 0.06 grain, expressed as sulphur trioxide, per cu. ft. Percentage condensations fell between 95.9 and 99.9. On two occasions, however, intervention by the inspector became necessary on account of undue fumes from the mixers and dens being caused by inadequate draught. In both instances the faults were promptly rectified.

Sulphate of Ammonia

There has been a further decline in the number of works in which sulphate of ammonia is manufactured, and many of those which are registered have operated only at infrequent intervals. Owing to the unremunerative character of the process there has been a tendency, in some quarters, for plant to be neglected. Some of the idle plant, indeed, is quite unfit for re-registeration, whilst, as regards operating plant, although, under the present conditions, inspectors are prepared to make all due allowances, yet it will readily be understood that leakages of sulphuretted hydrogen either from the plant itself or from the purifiers cannot be permitted. Not only may such escapes prove an annoyance to residents in the neighbourhood, but they may also constitute a serious danger to men working at or near the plant. That this statement is no exaggeration was shown by a fatal accident which occurred at a sulphate plant, where a man was found fatally gassed close by the purifier. The circumstances were found to be such as to demand drastic action, and proceedings were taken against the company. The maximum penalty and costs of action were recovered in April.

Nitric Acid Works

The number of registered works remains as before. These are nearly all in respect of nitration processes in which the nitrous gases evolved are recovered as nitric acid by means of water scrubbing. The bulk of the nitric acid is manufactured by the ammonia oxidation process. The only complaint received related to the gassing by nitrous gas of sewermen and was reported by the medical officer of the district. Fortunately the men were not seriously affected. The origin of the gas was traced to effluent from a works in London where a plant used for dissolving gold in aqua regia became unduly overloaded during the recent "gold rush." Normally the effluent from the scrubbing powers is neutral, but, as a result of the plant being overtaxed, a slightly acid effluent was produced. As a temporary measure arrangements were made for a supply of milk of lime to be added to the effluent before discharge into the sewer, but the scrubbers have now been reconstructed and a closed circuit of milk of lime has been substituted for the water feed.

Chlorine Works

The Staveley Coal and Iron Co., Ltd., has erected and put into operation a large Bachmann plant for the production of bleaching powder. This is the first of its kind in this country and is said, up to the present, to be entirely successful. The plant consists of a series of shelves built over one another and a central shaft, carrying arms and rakes, which rotates slowly. The arrangement is similar to that of a Herreshoff furnace, whereby lime is worked from the centre of one shelf to the circumference and then dropped to the next shelf where it is worked to the centre again, and so on. Chlorine gas is admitted near the bottom. The tail gases are draughted to an earthenware tower, which is fed with soda, and thence to atmosphere. The slaking and feeding of lime is chiefly mechanical and a draughting arrangement prevents dissipation of dust during packing. The entire plant being under suction, there is litle possibility of accidental chlorine leakage.

Towards the close of the year serious complaint was directed against a works in the London district which appeared to be justified. Extensions to manufacturing plant involving the use of chlorine had been made, and it was found that increased production had been commenced before the capacity of the waste gas scrubbers had been correspondingly increased. On representations being made, production was curtailed until the waste gas scrubber extensions were completed. The latter now possess greater capacity in relation to the output than they did before, so that there should be no further cause for complaint.

Sulphide Works

A violent explosion, which fortunately resulted in no personal injuries, occurred in a works where rubber is vulcanised by successive treatment with sulphur dioxide and sulphuretted hydrogen. The explosion took place while the residual gases were being swept out by a current of air and the door of the chamber was about to be opened. It seems that ignition must have been due to iron sulphide formed on the walls of the chamber becoming incandescent, and to the presence of sulphur dust. As a safeguard, a thin lead explosion panel has been put into the roof of the chamber. The British Dyestuffs Corporation, Ltd., at Blackley, has exploited a new and ingenious means of detecting the presence of very small quantities of sulphuretted hydrogen by allowing the stain produced on a lead acetate paper to interfere with a ray of light directed on to a selenium light sensitive cell. The electric current set up thereby is amplified and caused to ring a bell and to record the occasion. The gases are also automatically diverted to a fresh alkali scrubber. This clever contrivance has shown great promise and is being further improved.

There has been a slight increase in the quantity of tin ores calcined. The condensation and subsequent deposition of arsenious oxide has been quite satisfactory, tests made on escaping gases showing an average content of 0.04 grain of arsenious oxide per cu. ft. The lodes now being worked appear to be lower in sulphur and arsenic content than formerly.

Bisulphide of Carbon

An explosion occurred in the sulphur chambers of a Claus kiln used for recovery of sulphur from the waste gases of a carbon bisulphide plant. The chambers were partially destroyed and a workman was killed by falling masonry. It was established that the kiln manlid had been removed for the purpose of relighting the kiln consequent on the mass of bauxite losing its effective temperature. About three minutes later a flash was seen at the manlid and the explosion followed immediately. It is thought that oxidation of pyrophoric iron sulphide may have been the source of ignition. Research on the subject has been initiated by the company, and in the meantime resort was had to the combustion of the gases in the burners of a sulphuric acid plant. The acid plant being subsequently closed, permission was given, as a temporary expedient, to burn the gases with discharge of the resultant sulpnur dioxide to atmosphere via a high chimney. It was stipulated that sulphuretted hydrogen should be completely eliminated and that the total acidity of the chimney gases should not exceed 1 grain as sulphur trioxide per cu. ft.

Tar Works

The economy measures adopted by highway authorities have resulted in a slowing down of road construction and repair work, which has been reflected in the demand for dehydrated tar. On the other hand, owing to a rise in the price of pitch, there has been a tendency to increase the production of this material. There have been a number of occasions when it has been necessary for inspectors to call attention to defects in the treatment of tail gases. It is not yet appreciated that sulphuretted hydrogen is evolved throughout the whole of a distillation period and that the ejectors (where that means is employed) must be used continuously. Care should be taken that there is an ample supply of water for the condensers and fitting or suitably luted covers must be provided for the receiver boxes.

An elaborate system of condensers and washers installed at one works has resulted in an appreciable recovery of oil from the tail gases. The heat of the steam used to operate the ejector is partially recovered by submerging the delivery pipe in a boiler feed water tank before final combustion of the gases.

An explosion which occurred in a light oil still at a tar works happily resulted in no personal injuries. The fire had been drawn and the still emptied. This is yet another case where an explosion was attributed to pyrophoric iron sulphide, although it is conceivable that active carbon par-

ticles may have been responsible. In future the still will be lime or cement washed and steamed out. Two gasworks have used the sensible heat of their crude gas to effect dehydration of tar, and in both cases the process is said to be successful.

Benzene Works

Recovery of benzene is receiving general attention in the gas industry, and the number of plants registered under this heading has increased from 144 to 162. There is every indication that the increase will continue. In most cases the plants are designed to work in conjunction with existing naphthalene scrubbers with the primary object of regenerating the gas oil and freeing it from naphthalene. The benzolised oil is distilled to yield a crude benzol and a heavier fraction containing naphthalene. Moreover, the gum forming constituents of the coal gas, which have been a source of trouble in consumers' appliances, are removed by this means, and the relaxation of the National Benzol Association's standard, allowing for a reduced washing with acid and alkali and permitting the use of a stabiliser, such as tricresol, will reduce losses in the refining of the spirit.

The benzol recovered is usually about half of that available in the coal gas, but at some works the plant is designed for recovery of the whole of the benzene, and rectifying plant is provided so that a pure product can be made. In view of the increasing popularity of these plants it was felt desirable that some standard means of dealing with uncondensed gases should be adopted. Accordingly, makers of plant and other interests were consulted and three methods have been approved.

The Manufacture of Sugar from Beet

By J. H. WILSON

MR. J. H. WILSON presented a paper on "The Manufacture of Sugar from Beet" at a recent meeting of the Hull Chemical and Engineering Society. Following are extracts from Mr. Wilson's paper.

THE first beet sugar factory erected in England was in 1832 at Utling, near Malden in Essex, but it was a failure, due to financial difficulties, lack of technical knowledge, and the inexperience of farmers. Nothing concrete followed until 1912 when the first modern beet sugar factory was erected at Cantley, Norfolk. However, from 1901 onwards, various societies had conducted experiments in sugar beet cultivation, but all they could at that time accomplish was to prove that beet with a high sugar content could be grown in this country, and give yields equalling, if not exceeding, those obtained on the Continent. Several factory schemes were organised and carried through to various points of development but not to fruition. Had the English adopted a subsidy before the war as an incentive to education and enterprise, it is generally admitted that savings both to the consumer and to the Exchequer would almost certainly have been achieved in the long run. Prices before the war averaged about 2d. per lb., but during the war, Continental imports being cut off, a serious shortage of sugar resulted, and the price soared to 1s. 2d. per lb. The nation's supply had to be obtained chiefly from Cuba and Mauritius, and transported in ships which could ill be spared for the job, and many never reached their destination.

The Cantley factory operated for four seasons at a loss. From this date until 1920 no further manufacturing was done. In 1920 the Cantley factory made another attempt to start the industry, and in 1921 the second factory at Kelham was built. It was not until 1922, after a remission of the excise duty that an English beet factory operated at a profit. In 1925 the British Sugar Subsidy Act came into being, and this was the real beginning of the British beet sugar industry. Some 16,000 acres of sugar beet were grown in 1923, whereas 349,000 acres were grown in 1930, by 40,400 growers. While only two factories were in operation in 1923, eighteen factories were working in 1930. The production of sugar increased from 13,000 tons in 1922 to 290,000 tons in 1929, and to 420,000 tons in 1930. In 1922 the price paid for beet was 38s. per ton, while in 1930 the average price paid was 50s. per ton. The number of workers in the factories has increased from 1,159 to 9,900, and it is estimated that about 30,000 casual workers found employment in 1930, in the sugar beet fields.

Factory Operations

All weighing, sampling, tareing and subsequent testing in the tarehouse is under the supervision of a chemist, appointed by the National Union of Farmers, with a staff of three assistants to look after the farmers' interests. During our last campaign when between 90,000 and 100,000 tons of beet were worked, 19,226 official samples passed through the tarehouse, or an average of one sample for about 4.5 tons of beet. The beet are carried into the factory by water running down deep concrete channels called flumes. This method of transport results in a preliminary washing of the beet before entering the washing tanks. After being washed and weighed they are tipped into a large hopper which supplies the cutters below. The knives are serrated, and are so arranged in the blocks that they slice the beet into V-shaped shreds, which pass down a shute into the diffusion battery. The reason for the beet being cut into V-shapes is so that the greatest possible surface area is exposed to the diffusing action of the water in the battery. These V-shaped slices are called cossettes.

The diffusion battery consists of 14 cells arranged in a circle. Between each cell is situated a heater. The whole is interconnected, so that a continuous flow of liquid can pass through the whole battery. A water supply line is connected to each cell of the battery. Each cell has a capacity of 200 cu.ft., and holds approximately three tons of beet. Suspended across the interior of each cell are chains, so that the cossettes on being filled into the cell are less liable to clog together, and so impede the circulation of the extracting liquid during its passage through the battery. The bottom of the cell is closed by a hinged door provided with a perforated false bottom to prevent the flow of the cossettes with the juice during circulation. The door is sealed to prevent the loss of juice whilst under pressure by a tubular rubber gasket placed into a housing at the bottom of the cell to which is connected a 60 lb. water pressure to keep the rubber inflated. Under normal running conditions each cell is filled with cossettes in turn. Fresh water at about 40 lb. pressure enters the cell from which practically all the sugar has been exhausted. This passes up the heater and down the next cell, and so on around the battery. The density of the juice increases, due to the solubility of the sugar, as it flows from one cell to another. It finally comes in contact with the cell which was last filled with fresh cossettes.

A Diffusion Process

After passing through this cell a measured quantity of it is drawn off into a measuring tank from where it starts on its journey of purification. The amount drawn off varies according to the circumstances attending the operations. Generally about 9,000 lb. are drawn off per cell. The extraction of the sugar from the beet is a diffusion process pure and simple, with no question of pressing the juice out of the beet, as used to be the case in the early history of the sugar industry.

Heat is applied to the juice during its passage through the battery. The entering water is about 45° C., and between the third and the ninth cell a temperature of about 80° C. is maintained, after which it is allowed to cool off to 55° C. before passing to the measuring tank. Temperature of diffusion juice is raised to a point just enough to soften the cossettes but not to scald them. Scalding renders them too soft, and causes them to lie on one another, close the screens at the bottom of the cell, and obstruct the circulation of the juice. Another objection to too a high temperature is that it causes increased amounts of non-sugars to be diffused, which makes the crystallisation of sugar more difficult. The prevailing circumstances, of course, influence the fixing of the temperature. For instance, should the beet be fermented, unripe or frozen, the temperature should be kept at the lowest limit. The percentage of sugar in the beet averages about

16.5 per cent. to 17.5 per cent., but we have received beet with a sugar content of over 20 per cent. About 0.22 per cent. sugar remains in the exhausted cossettes, and it is uneconomical to try to extract this, besides which, further extraction would increase the non-sugars in the juice to such an extent that troubles in carbonation and filtration would follow, due to the chemical nature of the extracted solids. The exhausted beet is now known as pulp, and the surrounding water as pulp water. The pulp water contains about 0.11 per cent. sugar. The combination of the loss in pulp and pulp water is known as battery losses.

Treatment of the Juice

The diffusion juice is of a dark grey colour. It has a brix of 12.5°, which corresponds to a specific gravity of 1.05. Specific gravity is seldom heard in a sugar factory, but the term brix is in constant use. The brix hydrometer is a hydrometer specially made for the sugar industry which indicates the total percentage of solids in a pure sugar solution. The percentage of sugar is obtained by use of the polariscope. Without the invention of the polariscope, and the subsequent improvements in its construction, it is almost certain that the sugar industry as it is known to-day with its highly technical manufacture and control, and the mass of important data collected, would not be in existence. The purity of the juice is a figure which gives the percentage of ratio of the sucrose to the total solids in the solution, and it is to this figure that great importance is attached throughout the operations of the sugar factory, because the greater the purity the lower must be the dissolved impurities, and therefore the greater the extraction, remembering that every 1 lb. of impurity takes with it $1\frac{1}{2}$ lb. of sugar into the molasses or final by-product.

The diffusion juice is about 80° C. and passes to the first carbonation station. Lime is the agent used in the initial purification of the juice. The action of the lime is threefold (1) sterilisation, (2) precipitation, and (3) decomposition. In the beet juice are fungus germs of many kinds which are introduced from the soil, water, air, and sometimes diseased and decomposed beet. When the juice is treated with lime under high temperatures all the germs are killed, hence the process may be called the sterilisation of the juice. Beet juice contains impurities which can be moved, or be made less objectionable to the crystallisation of sugar by treatment with lime. There are in beet juice many organic acids, whose calcium salts are insoluble or difficultly soluble in water, such as oxalic and tartaric acid, etc. These compounds may be removed wholly or partially by treatment with lime. Nitrates and ammonium salts are also found in beet juice. Organic compounds found in beet juice which could not be precipitated but may be decomposed by the action of lime are albumen, invert sugar, and amides. Albumen is partly coagulated by heating the juice, but the greater part remains dissolved in the juice. When the juice is limed the soluble albumen is decomposed, first into peptone, and later into amido-acids, such as leucine, aspartic acid and so forth. Peptone is uncrystallisable but the amido and their salts are crystalloids.

Second Carbonisation

The carbonated juice is passed through another heater, and brought up to a temperature of 90° C. before being pumped to the continuous vacuum filters, which are Oliver thickeners. At the second carbonation an optimum point is obtainable, over saturation resulting in the redissolving point of lime salts. Great attention is given to this second carbonation control, because the continual passing forward of juice with high lime salts to the evaporators is liable to cause rapid depositing of these salts on to the heating tubes, thus rendering them less and less effective, until finally a shut-down is necessary to descale them.

The juice is again heated up to about 90° C., which breaks up any calcium bicarbonate formed during saturation, when it is immediately pumped to the second carbonation filter station. Here filtration takes place through plate and frame presses. A third saturation is sometimes used, but in this case sulphur dioxide gas is the medium. This is generally done in factories where white sugar is being manufactured, but in the case of factories where raw sugar only is made it is often dispensed with. The object of the sulphuring is further to reduce the alkalinity of the juice, and to improve the quality before concentration.

The evaporation is accomplished in a multiple effect evaporator. In our case quintuple effect evaporation is installed. Juice enters the first body, and boils at about 110° C. under a pressure of 7 lb. per sq. in. Exhaust steam at 12 lb. pressure is used to heat the juice by passing through brass tubes, of which there are 1,616 in the first body. The juice is evaporated, and the vapours are conducted into the steam chest of the second effect, where it uses up its heat in evaporating juice which has entered this body from the first body. Here the juice is boiling at 104° C. under 1 lb. pressure. Again the vapours from the second body are conducted into the steam chest of the third body, and evaporates juice entering from the second body. This process is repeated up to the last body. The juice leaving the fifth body has been concentrated to a brix of about 70°, *i.e.*, from about 11 to 70 per cent. solids. When it is realised that over 1,500 tons of water per 24 hours must be evaporated by these bodies it shows the importance and necessity of this station. The juice thus concentrated is known as thick juice. Sulphuring is again used when making white sugar, and the juice alkalinity is brought down almost to neutrality, but again this is dispensed with when making only raw sugar. Filtration is necessary before it is finally pumped to the pan floor to be still further evaporated in the pans to the crystallisation stage.

The Boiling Pans

Only a slight rise in purity is recorded in this stage of manufacture, especially if sulphuring is not used. Thick juice thus obtained contains besides sucrose a certain amount of non sugars, some of which are less soluble, and some more soluble than the sucrose. The art of sugar boiling is to accomplish the crystallisation of sucrose, at the same time retaining as much non-sugar as possible in the mother liquors.

The juices are boiled in large pans of about 1,100 cu.ft. capacity under vacuum, which enables boiling to take place at a lower temperature, and thus prevent the caramelisation, or burning of the crystallised product. A charge is first drawn into the pan of about 600 cu.ft. and concentrated to super-saturation, or "graining" point, when crystallisation commences. Sometimes crystallisation is promoted by "seeding," or the introduction of sugar crystals into the pan, as soon as supersaturation occurs. As evaporation proceeds more and more crystals are formed, and it is here that the finest art of the sugar boiler is brought into use to judge when a sufficient number have made their appearance to answer the purpose. By continuing concentration of the syrup and the addition of fresh juice the volume of the mass will gradually increase until when the pan is sufficiently filled boiling is continued without the addition of thick juice. When the pan loses its fluidity to such an extent that a sample drawn from the pan and placed on a glass plate does not flow away boiling is complete. This process is commonly called "Brixing." The mass is now known as fillmass (German) or massecuite (French). When boiling is complete all steam valves, and the condenser water valve, are closed, the vacuum breaking valve opened, and the fillmass is slowly allowed to fall into a reservoir below called a mixer. The mixer serves as a supply to the centrifugals below. Here the separation of the crystals from the mother liquor takes place.

Final Stages

The sugar is dumped into a scroll below, and passes by way of an elevator to the dryer or granulator. The moisture content of the sugar is then about 1.3 per cent. The dryer is a long inclined revolving drum, fitted with a series of small shelves inside. These pick up the sugar, and carry it to the top of their travel, when the sugar falls off in a kind of spray. A current of air heated by passage through steam pipes is sucked through the drum and dries the sugar before it finally falls down a shute into the sugar bin, ready to be packed for sale. The moisture content is reduced to about 0.05 per cent. Besides drying the sugar the air suction carries along with it fine particles of sugar which are trapped in a stream of water in a dust box and returned to the process. The green and wash syrups, after filtration, are returned to the pan floor for further boiling into lower grade pans by

exactly similar methods as before. The sugar from these pans is either remelted, when manufacturing white sugar, or bagged along with the first product sugar in raw sugar manufacture.

The polarisation of raw sugar must be between 98 and 99 to satisfy Government regulations under the Subsidy Act, and this has a purity of about 99 per cent. The green and wash syrups from the second boiling are again returned to the pan floor for further boiling.

The third boiling is somewhat different from the previous two, because of the concentration of non-sugars in the lower grade syrups. Boiling is continued on much the same lines as before, but at the finish of the boiling the fillmass has a sticky nature, and crystallisation is not complete, and it is impossible to spin in the centrifugals as before. It is therefore allowed to flow into crystallisers, which are simply large cylinders provided with an agitator and a water jacket. The temperature is allowed to fall slowly from about 80° C., which is the temperature of boiling, to about 40° C. Three days is about the time taken for this operation before the fillmass is ready to be spun out as before. During the cooling process slow crystallisation takes place, and the fillmass loses its sticky nature to a certain extent.

The power side of the factory at Selby is supplied by a 625 kW turbine, and a 400 kW reciprocating engine. The steam necessary for these is supplied by six Babcock and Wilcox boilers each rated at 300 h.p. working at 160 lb. per sq. in. pressure. Most of the evaporation is done by exhaust steam from the engines wth a certain amount of live steam make-up operating through Locke regulators. The following particulars of the materials used during our last campaign show how a number of industries benefit by the operations of beet sugar factories:—Beet bought, 90,000 tons; coal used, 10,000 tons; limestone used, 3,300 tons; coke used, 330 tons; filter cloth, 3,000 yards; soda ash, 30,000 lb.; raw sugar bags, 125,000 bags; pulp bags, 130,000; knives, 3,000. Besides these, quantities of acids, sulphur, oils, jute twine, etc., are used.

The Importance of Celluloid in Industry

An International Labour Office Review

SAFETY in the manufacture and use of celluloid and its importance in industry form the subject of a publication issued by the International Labour Office, price 4s. Technically, states the publication, the manufacture of celluloid is a relatively simple process. Nitrocellulose is kneaded together with camphor, and the resulting substance is stained. According to Will and Dubowitz, commercial celluloid (camphor celluloid) consists roughly of 50-70 per cent. nitrocellulose with a nitrogen content of 10-11 per cent., 15-35 per cent. camphor, and 0-15 per cent. added substances—filling, colouring and softening materials—which alter the properties of the celluloid in different ways according to the purpose in view. Other analyses have shown the added substances to account for from 25 to 50 per cent. of the total weight. For softening materials (plasticisers) use is made of vegetable oils (*e.g.*, castor oil), glycerine compounds, tricresyl phosphate, etc. The commonest filling materials are gelatine, gum arabic, train oil, borax, alumina and zinc white. The methods of mixing these substances are mostly preserved as trade secrets, since the properties of the finished goods depend on them to a high degree.

A Search for Substitutes

Formerly, the camphor used was exclusively the natural camphor obtained from Japan, China and Formosa, a distillation product of volatile camphor oil. It is a white, crystaline, friable substance, very soluble in ether, alcohol, and certain other liquids, but quite insoluble in water. It melts at 177° C., but volatilises at ordinary temperatures. At the present time synthetic camphor is also obtained from American oil of turpentine, and this variety is now used almost exclusively in Germany. Several attempts have been made to replace camphor entirely by other and cheaper substances, and, incidentally, to lessen the characteristic camphor odour of celluloid; but of the countless patents taken out for this purpose, very few have been actually worked. Among the substitutes proposed are said to be chloral hydrate, urea compounds and chlorinated hydrocarbons. Crude celluloid is amorphous, transparent, very strong, elastic, hard and very light (specific gravity about 1.4). Like horn, it is unbreakable, and very tough. It possesses a fine, slightly shiny surface. When uncoloured, and without additions, it is seldom employed; transparent celluloid is mainly used for safety glass in protective screens on motor-cars and other vehicles. Usually it is stained with rather bright colours, which can be done very easily, and in the most varied ways. The finished celluloid has a shiny surface, is relatively hard, and at ordinary temperatures rather insensitive to chemical action.

Many articles in general use are made entirely of celluloid. Celluloid is also worked in combination with other raw materials, sometimes as the preponderant component, and sometimes forming only an insignificant part of the finished article. Such use is exemplified by celluloid handles for umbrellas and sticks, celluloid buttons and fastenings on clothes and shoes, celluloid parts of electrical apparatus, celluloid coverings on boxes, mirrors, ornaments, tooth and other brushes, spectacle frames, writing materials, piano keys, and many other articles, not excluding the celluloid tips of shoe laces. There is probably no line of business in which goods with celluloid parts are not to be found. They form part of the stock of establishments selling articles ranging from writing materials and paper articles, ladies' stockings, gold and silver ware, to provisions, drugs, pianos and motor-cars.

The useful properties of celluloid, which are responsible for its wide and varied distribution, are unfortunately offset by serious defects. It ignites very easily and burns with a very smoky flame. One kilogram generates from 3,500 to 4,500 calories and, according to Bonwitt, the combustion temperature may reach 1,500-1,700° C. Particularly dangerous are the loose scrap, shavings and dust produced in working-up processes. Once alight celluloid burns with extraordinary rapidity, particularly in large quantities. In America 850 kg. of celluloid film was consumed in three minutes in a testing chamber, and 32,000 lb. in a Massachusetts warehouse in sixteen minutes. During a big fire in Germany, about 50,000 kg. was consumed in an hour; and in another, about 10,000 kg. in half an hour.

Protective Regulations

Celluloid does not ignite or explode spontaneously, nor can it be made to burn by mechanical action, such as friction, shock or impact. But certain varieties can undergo flameless decomposition at temperatures above 100° C., in the heat radiated by steam and other heating systems for example; or by continued exposure to a powerful electric lamp. The resistance depends upon the composition, more particularly the proportions of filling and colouring substances. In such case combustion is accompanied by clouds of inflammable camphor fumes, oxides of nitrogen, carbon monoxide and prussic acid, all of which are very poisonous and usually arise in such quantities that all the air in the premises is speedily forced out. Thus, if suitable measures are not taken, the dangers to which industrial workers, the neighbourhood of undertakings, and the general public are exposed in the manufacture and working of celluloid have been shown to lie in (a) the high inflammability of the celluloid and its raw materials; (b) the ease with which celluloid is decomposed by radiated heat, poisonous and in some cases explosive gases and vapour being generated; (c) the explosibility of nitrocellulose when dry; (d) the danger of ignition and explosion of the solvents; and (e) the noxious effects of any vapours and solvents inhaled.

In order to eliminate these dangers as far as possible, many factory and warehouse regulations have been drawn up by the Governments of all countries manufacturing celluloid. This book contains lists of all the regulations governing celluloid manufacture as instituted by the Governments of Great Britain, Germany, Italy, Denmark and Sweden.

Refrigeration and the Public Health

Exhibition of Refrigeration Materials

MAJOR THE HON. OLIVER STANLEY, M.P., Minister of Transport Sir George Newman, chief medical officer of the Ministry of Health, and Sir Frank Smith, secretary of the Department of Scientific and Industrial Research, were among the distinguished guests present at the annual summer meeting of the British Association of Refrigeration, which was held at Imperial Chemical House, London, on July 5. The luncheon was followed by an exhibition of chemicals and appliances used in the modern practice of refrigeration. A feature of the exhibition was the reading of short papers by Dr. F. A. Freeth, F.R.S., chief research chemist of Imperial Chemical Industries, Ltd., on "The Chemistry of Refrigeration," by Dr. E. Griffiths, F.R.S., of the National Physical Laboratory, on "Problems of Insulation," and Mr. W. H. Gressley, chief engineers of the L.N.E.R., on "Refrigerated Transport."

The exhibits covered the range of those chemicals upon which refrigeration depends. A special feature consisted of cylinders containing the four refrigeration chemicals in most common use. The first of these is anhydrous ammonia, the most efficient chemical known for use as a circulating fluid for large scale refrigeration plants and containing less than 0.02 per cent. of total impurities. The next two are methyl and ethyl chlorides, chemicals particularly well adapted for small low pressure plants—methyl chloride being a particularly convenient, quick-freezing medium for small units. It is moreover, stable under refrigerating conditions, does not hydrolise, and is 99.9 per cent. pure. Ethyl chloride is 99.8 per cent. pure. The fourth common chemical is liquid sulphur dioxide, a refrigerant largely used in domestic refrigerators, and which is produced with a specially low water content. It is guaranteed to contain not more than 0.003 per cent. of water and is in consequence absolutely non-corrosive. The efficiency of a refrigerating fluid depends primarily on its purity, and the purity of the chemicals shown was sufficiently guaranteed by the fractions of 1 per cent. of impurity they contain. Such a high standard of purity is an entirely modern attainment, and fifty years ago was undreamt of outside the laboratory.

The "Drikold" Exhibit

In addition to these more or less standard fluids, there was exhibited the new refrigerant "Drikold" or solid CO_2. The temperature of this solid is $-110°$F., or 142° of frost. The solid does not melt but slowly vanishes, literally into thin air. Correctly applied it can maintain a constant temperature at any point between minus 75°F. and atmospheric temperatures, and is as dry as it is cold. The gas to which it changes without the intermediate formation of liquid, is not corrosive, and no residue remains after evaporation. It is clean, has no taste or smell, and its high degree of purity enables it to be used in connection with perishable foodstuffs. In consequence it is opening up a new chapter in the history of refrigeration by making possible the transport of perishables in hitherto untried ways.

Among the exhibits were three not strictly speaking refrigeration agents themselves, but intimately bound up with the science of refrigeration. The first of these was calcium choride, in solid, broken and flaked form. This is used for making the brines employed as a medium for transferring cold from one part of the refrigeration plant to another. The magnesium chloride content of I.C.I. calcium chloride is particularly low, a brine of specific gravity 1.20 containing only 0.05 per cent. of magnesium chloride. This is an advantage in avoiding corrosion and it also prevents scaling and clogging due to ammonia leakage. It has a guaranteed maximum moisture content of 30 parts per million.

Two other I.C.I. products of advantage to refrigeration engineers are the special copper tubes used in the intricate pipe work of a modern refrigeration plant, and the "Pioneer" blocks and plasters for the construction of walls and partitions in cold stores. These anhydrite materials are specially suitable for low temperature constructional work by reason of their freedom from the movements usually caused by the variations of temperature and the high humidities inseparable from refrigeration plants. Both plasters and blocks are sufficiently absorbent to withstand the combination of low temperature and moisture without damage or condensation troubles. At the same time they can be cheaply and effectively waterproofed by treatment with a paint such as "Dulux," which provides a durable finish that will withstand refrigeration conditions.

Purity of Synthetic Products

Dr. FREETH confined his address to the purity of refrigerating chemicals and their origin. "There is a certain temperaturue" he said, "above which a gas cannot form a liquid, no matter how much you compress it—a liquid for the purpose of this discussion being something which can have a 'top,' not in the brewing sense." If the material was not rigorously pure, the apparent liquefying temperature might be lowered by a good many degrees. In the case of carbon dioxide, for example, given a hot summer, a high temperature of cooling water and an impure gas, there was no liquid at all. It was axiomatic that chemicals supplied to the refrigeration industry must be of the highest degree of purity. This question of purity led at once to the difference between natural and synthetic products. A strong residuum of paganism still existed in all ranks of society. There was a prevalent idea that things made by nature were superior to things made by man. Practically no substance obtained from a natural source was pure—that was to say, the same all through; really pure materials were produced by man.

It was as well to consider the meaning of the word "purity." Sometimes it meant as good as can reasonably be got, as in the case of, say, milk. Sometimes it meant non-harmful, as in the case of water. Pure water was extraordinarily difficult to prepare, and if drunk in quantities it was exceedingly bad for health, as the fairly pure water obtained in the High Alps was known to be. Purity from the point of view of refrigeration engineering meant that the chemical in question was the same all through, *i.e.*, if frozen, it froze solid at a constant temperature; if distilled by the ton, the last ounce of mother liquor had the same composition as the first ounce of condensate and it was impossible to detect the difference between one sample and another. There was a tendency for people to make a whipping-boy of a new product. Every big change had always been accompanied by a storm of criticism and disapproval.

Research in Refrigeration Problems

Dr. GRIFFITHS said that great advances had been made in recent years in the science of refrigeration, to which many branches of science and industry had contributed. The engineer, for example, had improved transport facilities and developed equipment. The chemist had brought forward new refrigerating agents. The biologist was steadily pursuing the study of the changes that take place in foodstuffs during storage. It was only within recent years that the idea of an optimum temperature for the storage of living foodstuffs had been realised.

Another important line of investigation was that of the evaporation of water from stored foodstuffs. This had an important bearing on the question of the "bloom" on frozen lamb. To arrive at the causes of the loss of "bloom," a detailed study had been made of the entire chain of processes, from the killing floor in New Zealand to the London market. The result of this inquiry had been that improvements had been suggested in practically every stage of the process, and the extent of the loss of the environment. This in turn had led to the study of the fundamental basis of the subject. Experiments were in progress on cylindrical and plane surfaces with the object of studying the relation between the rate of evaporation of water from a moistened surface and the velocity of the air relative to the surface and the geometrical form of the surface. The engineering side of refrigeration had presented an interesting problem in the design of air-cooling batteries. A study had been made of piping arranged in square and staggered formation in an air stream. The results showed what contribution is made by each pipe in the bank and the effect of introducing turbulence in the air stream on the value of the co-efficient of heat transmission.

Beilby Memorial Awards

Distinguished Work by Two Recipients

THE administrators of the Beilby Memorial Fund (the presidents, hon. treasurers and secretaries of the Institute of Chemistry, the Society of Chemical Industry, and the Institute of Metals) have announced the award of one hundred guineas each to Dr. Constance F. Tipper (née Elam) of the Engineering Department, Cambridge University, and to Dr. A. J. V. Underwood, chemical engineer.

Mrs. G. H. Tipper (Constance F. Elam), M.A., D.Sc., was educated at Newnham College, Cambridge. From 1916 to 1917 she was an assistant in the metallurgical department at the National Physical Laboratory, Teddington, and from 1917 to 1927 worked at the Royal School of Mines, South Kensington, where she was research assistant to Professor Sir Harold Carpenter, held the Frecheville Research Fellowship, and received grants from the Department of Scientific and Industrial Research. During short periods between 1917 and 1920 she also worked in the Cavendish laboratory, Cambridge, and at the Davy-Faraday research laboratory of the Royal Institution. In 1924 she was elected Armourers' and Brasiers' Research Fellow in metallurgy and held this Fellowship for the maximum period of five years. In 1928 she married Mr. G. H. Tipper, M.A., formerly superintendent of the Geological Survey of India and since that time has conducted research in the Engineering Department of Cambridge University. She held a Newnham College Research Scholarship for the year 1930-1931. The Royal Society has made grants to Dr. Tipper for apparatus required in connection with the work on which she is now engaged.

Dr. Tipper's Publications

Dr. Tipper has published much scientific work—twenty-one papers in all—including six in conjunction with Professor Sir Harold Carpenter, F.R.S., three in conjunction with Professor G. I. Taylor, F.R.S., and twelve independent publications. Her work in the first group includes papers read before the Institute of Metals, on "An Investigation on Unsound Castings of Admiralty Bronze (88 : 10 : 2), its Cause and Remedy," "Crystal Growth and Recrystallisation in Metals," and "Stages in the Recrystallisation of Aluminium Sheet on Heating"; before the Royal Society, on "The Production of Single Crystals of Aluminium and their Tensile Properties," and "Experiments on the Distortion of Single Crystal Test-Pieces of Aluminium"; and before the Iron and Steel Institute, on "The Effect of Oxidising Gases at Low Pressures on Heated Iron."

In the second group are papers read before the Royal Society on "The Distortion of an Aluminium Crystal during a Tensile Test"; "Plastic Extention and Fracture of Aluminium Crystals"; and "The Distortion of Iron Crystals." The greater proportion of Dr. Tipper's work, which was done independently and published by the above-mentioned bodies, relates principally to metallic crystals. A bibliography entitled "The X-ray Investigation of Alloys—a Summary of published information 1921-1928" appeared in the "Journal of the Institute of Metals" in 1929. More recently she has turned her attention to archaeology and has read before the Institute of Metals papers on "An Investigation of the Microstructure of Fifteen Silver Greek Coins (500-300 B.C.) and Some Forgeries" and "Some Bronze Specimens from the Royal Graves at Ur."

Dr. Underwood's Career

Dr. A. J. V. Underwood, D.Sc., was educated at Leeds University where he graduated with first class honours in both mathematics and engineering, and was a Research Scholar from 1918 to 1920. He took a post-graduate chemical engineering course at the Imperial College of Science and Technology, London, from 1920 to 1921, and qualified as an associate and later as a full member of the Institution of Chemical Engineers, on which body he has since served as a member of council and examiner. He is at present practising as a consulting chemical engineer, and is an honorary lecturer in the Ramsay Laboratory of Chemical Engineering, University College, London.

His practical experience has been connected with explosives, poison gas, alkali manufacture from natural deposit, beet sugar, wood distillation, fermentation, catalytic processes for solvent manufacture, and has been gained in Great Britain, Kenya Colony, Yugoslavia and elsewhere. Dr. Underwood has published a large number of papers on chemical engineering subjects, notably in connection with filtration, distillation and flame temperatures. His treatment has been mainly mathematical and he has developed original quantitative methods for interpreting and applying basic chemical engineering processes.

The Beilby Memorial awards are made from the interest derived from the invested capital of the Sir George Beilby Memorial Fund, at intervals determined by the administrators to British investigators in science to mark appreciation of records of distinguished original work, preference being given to investigations relating to the special interests of Sir George Beilby, including problems connected with fuel economy, chemical engineering and metallurgy. Awards are not made on the result of any competition, but in recognition of continuous work of exceptional merit, being evidence of distinct advancement in knowledge and practice.

Drug Incorporated

Dissolution into Separate Units

THE reorganisation of Drug Incorporated, which will result in the dissolution of the $150,000,000 holding corporation and the re-establishment of its five principal operating subsidiaries as independent companies was recommended in New York on June 29, by a unanimous vote of its board of directors which includes in its membership some of the largest stockholders in the corporation. A special meeting of stockholders has been called for August 7 to implement the proposal.

The companies which will emerge from the reorganisation as independent units are:—Sterling Products Incorporated, United Drug Co., Bristol-Myers Co., Vick-Chemical Co., and Life Savers Incorporated. The segregation proposed by the directors will reverse the process by which Drug Incorporated with its subsidiaries became the largest manufacturing and distributing organisation in the world drug industry.

Upon consummation of the plan shareholders will receive *pro rata* for each 10 shares of Drug Incorporated a total of 14 shares of the new corporations as follows:—Five shares of Sterling Products, four shares of United Drug, two shares of Vick Chemical, two shares of Bristol-Myers, and one share of Life Savers.

In a letter to the shareholders of the corporation, Mr. A. H. Diebold, president of Drug Incorporated, stated that the directors believed that the earnings of the separating units woud be such that the aggregate dividends to be paid by the corporations would at least equal the $3 a share dividend of Drug Incorporated. The best interests of the stockholders of Drug Incorporated would be served if the proposed segregation was carried out. Looking toward the future the board believed the drug industry was such that the units would function more effectively by themselves than if they were under the control of a holding corporation such as Drug Incorporated. While Drug Incorporated had always had an enviable record as regards earnings, the board believed that with the executives of the various companies in a position solely to devote their energies to their own companies, new developments would be effected, and better operating results would be shown to stockholders. The new corporations would be under a direction which would include the executive now conducting the existing units.

In its annual report for 1932, Drug Incorporated showed total assets of $130,627,017. Gross profits for 1932 amounted to $59,753,085, while net profits were $13,467,092. Its capital stocks consists of 3,501,499 outstanding shares at $10 par value, totalling $35,014,990, with a capital surplus of $26,790,658 and earned surplus of $24,924,232.

Letters to the Editor

The Editor welcomes expression of opinion and fact from responsible persons for publication in these columns. Signed letters are, of course, preferred, but where a desire for anonymity is indicated this will invariably be respected. From time to time letters containing useful ideas and suggestions have been received, signed with a nom-de-plume and giving no information as to their origin. Correspondence cannot be published in THE CHEMICAL AGE unless its authorship is revealed to the Editor.

Dr. Michael Polanyi's Appointment

SIR,—The announcement that Dr. Michael Polanyi has accepted a chair of physical chemistry in the University of Manchester will no doubt excite considerable interest. Professor Polanyi will be welcomed to these shores and it may be hoped that he will have no reason to regret his stay among us. There has been much condemnation of the intolerance towards the Jews which has caused Professor Polanyi to resign his post as a protest. Traditionally the Jews have been a race destined to receive more than their share of the contumely of the Proud Ones of the earth. Historically they have been, by their financial genius, the mainstay of many a kingdom. Pharaoh and Egypt lost heavily by the oppression of the Jews: England's power dated from after the period when the Jews were persecuted. The downfall of Spain dated from the expulsion of the Jews from that country; the Tsars down-trod the Jews—where are now the Tsars? Should not Hitler, himself one of the historic figures of the history of the world, take note of the teachings of history? We must honour Professor Polanyi for his protest.

But whilst Professor Polanyi's appointment is welcomed, one feels it is only right to ask whether *as a considered policy* it is in the best interests of the country and of the profession of science that posts for which many a young British scientist is yearning, and has been yearning through long years of his earlier struggles, should be given to foreigners. It is all to the good that nations should understand each other; it is highly desirable that British students should go abroad and that foreign students should come here; it is also to the good that professors and teachers should be interchanged for a definite term: but it is doubtful whether it is either sound economics or good policy to take away from our own youth the prizes for which they have struggled.—Yours faithfully,

M.R.S.T.

Scale Prevention in the Boiler

SIR,—In THE CHEMICAL AGE of June 24 (page 570) you give prominence to an article entitled "Scale Prevention in the Boiler." Your paper forms one of many in our library, but we never before remember reading an article in which so many strange statements are made. The following passage, which occurs midway through the article, is a confusion of ideas:

> "Caustic soda had previously been tried, and had given alleviation, but this was discarded on the possible steel embrittlement of the plates. Sodium sulphate helped to reduce the scale considerably, and a mixture of the sulphate and carbonate tried, together with a small quantity of sodium aluminate as a coagulant, the results obtained being very promising.

We do not think it is true to say that sodium sulphate will help to reduce scale. On the other hand, sodium sulphate is a factor which must be considered in boiler water conditions, as if it exists in too high a proportion as compared with the carbonate content, calcium sulphate scale will be formed. In the case mentioned, we are of the opinion that the scale reduction was due to the use of sodium carbonate and sodium aluminate, the sulphate being used as an inhibitor of embrittlement ratios.

We deprecate the suggestion that it is quite out of the question to treat waters containing more than seven grains of incrusting solids per gal. by theoretical quantities of alkali because we are assisting our customers to achieve this object in many boilers using "Alfloc" sodium aluminate as the coagulant.

The writer of the article is entirely in error in assuming that whilst under treating with alkali, good results can be obtained by any of the various products he mentions. No chemist would advise the use of ferrous sulphate or aluminium sulphate, for example, with insufficient alkali present, on account of the acid nature of these salts. The use of products like starch, viscose, quebracho, etc., has little to recommend it. The only scientific use of tannins depends on their value in absorbing oxygen, for which purpose the tannins must be specially chosen and on their power of preventing feed line incrustation produced by the use of alkali in the feed water. The statement that "they can be added to the feed water and allowed to remain in the boiler, with the exception of the aluminate, as they are quite innocuous" should be entirely deleted. As a matter of fact, the sodium aluminate, as an alkaline coagulant, is the only safe internal coagulant to use as we have proved on many occasions.

In studying boiler water problems, it should always be remembered that, normally, the water contains a proper excess of sodium hydroxide, together with sodium carbonate and/or sodium phosphate; hence the reaction of a simple salt in aqueous solution may be greatly modified under the above conditions. The essential principle of modern boiler water chemistry is so to adjust the relation of the ions that scale is prevented and corrosion inhibited. It is a great pity, therefore, that some of the statements should appear in the guise of an article written by a chemist, as little accurate chemical knowledge is displayed. It is not correct to say that sodium sulphate is an alkaline soda base, nor does it dissociate in boiling water to give caustic soda. Calcium nitrate, magnesium nitrate and chloride will not give any alkaline reaction to phenolphthalein and methyl orange whilst the latter commence the well-known cycles of acidic corrosion. The use of the alkaline coagulant "Alfloc" sodium aluminate is becoming standard practice in the internal treatment and conditioning of boiler feed water by the "Alfloc" system and full information will be gladly given to your readers.—Yours faithfully,

ALUMINIUM (II) LIMITED.
(Water Treatment Service.)

Bush House,
Aldwych, W.C.2.

Industrial Development in 1932

Establishment of New Factories

WITH the "Board of Trade Journal" of June 29 was issued a survey of industrial development in 1932, in which was shown the establishment of new factories, the extensions to existing factories and the closing down of other factories during last year. The survey covers factories where 25 or more people are or have been employed. For its purpose the United Kingdom has been divided into 42 areas, grouped into nine regions. It discloses that 646 new factories were established, 166 extended and 355 closed down.

A general trade classification of the new factories is set out in the survey, which shows that in the chemical industry 27 new factories were established, five extended and eight closed down. Pharmaceutical preparations and toilet requisites such as face creams, tooth pastes and perfumery are included in the chemical group. The new factories are for the most part in London and the South of England.

Wood Hydrolysis Products

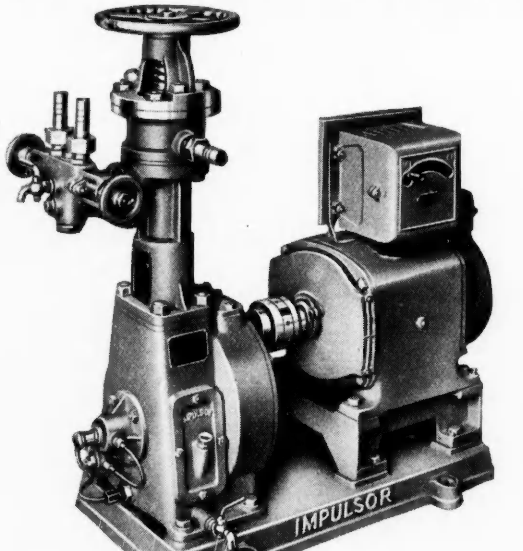
REVIEWING the latest developments in the field of carbohydrates and proteins as products of wood hydrolysis, in an address to the Verein Deutscher Chemiker, Dr. F. Honcamp (reported in Chemiker-Zeitung of July 1, 1933, page 516) indicates the possibility of obtaining a combined carbohydrate-protein cattle feed with the aid of the so-called wood sugar yeasts. The latter, it has been discovered, are capable under certain conditions of fermenting aqueous sugar solutions and of utilising inorganic nitrogen in the synthesis of albumen. A comparatively large output of "fodder yeast" has now been achieved by growing these yeasts in wood sugar solution and the nitrogenous product of wood sugar yeasts are found to be equal in digestibility to those from beer yeasts.

Advances in the Technique of Emulsification

The Impulsor Emulsifier

EMULSIONS form the basis of so many manufactured products that any advance in technique or apparatus for their preparation is of interest in the chemical industry. A principle which enables manufacturers to cheapen their emulsion production methods, without any reduction in quality, and in most cases with a marked improvement, cannot be ignored by a competent management. Such a principle is that upon which the Impulsor Emulsifier is based. This new emulsifier was introduced only a few months ago by the Improved Emulsification Process Co., Ltd., and it marks a definite step forward in the manufacture of emulsions. The Impulsor method of emulsification consists in subjecting the two phases of an emulsion to a rapid series of pressure changes followed by an intense shearing force. The first treatment brings about intimate mixing and partial emulsification of the two liquids, while the final process results in the oil globules being reduced to a particularly fine state of sub-division. Both these processes are carried out successively in the same machine.

As illustrated in the accompanying diagram the machine consists of a cylinder (C) within which a plunger (B) is caused to reciprocate by means of a crank drive (G). There are two inlet feed connections at (A) with corresponding needle valve controls having vernier scales. The oil and water phases are fed from separate tanks to the two inlets on the machine and the rate of flow of each is accurately regulated by means of the valves so that the correct proportions are obtained in the emulsion. The suction stroke of



The Impulsor Emulsifier, Motor driven Model, occupying only 36 ins. by 18 ins. of Floor Space and standing 36 ins. high.

the plunger draws the materials into the mixing space past a non-return valve. The return stroke then compresses tnese liquids until at a pressure determined by the powerful outlet valve spring at (D) controlled by the handwheel (F), the valve opens and a portion of the mixture is expelled at nigh velocity through the narrow gap between valve and seat.

The Impulsor runs at about 275 revolutions per minute and the consequent rapid changes of pressure result in violent agitation and mixing of the two phases. The volumes and displacements have been so designed that every portion of the mixture is subjected to the same number of pressure oscillations before ejection through the outlet valve. All premixing is eliminated by the Impulsor, thus effecting a saving both in time, labour, and expense of machinery. The capacity of the Impulsor emulsifier is 80 to 100 gal. per hour, according to the viscosity of the material being treated. Yet the overall dimensions are only 3 ft. by 1 ft. 6 in. by 3 ft. for the motor-driven model. This compactness for such capacity effects a useful saving in floor space. The power required is correspondingly low, 2—3 H.P. being sufficient

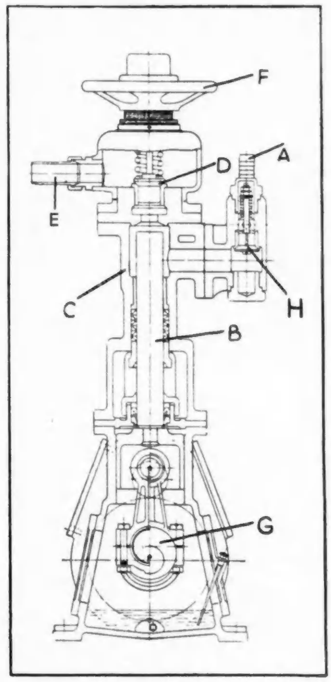


Diagram of the Impulsor New Principle Emulsifier.

to produce full capacity per hour. A belt-driven model is also available.

A smaller model has recently been introduced, having a capacity of 10—15 gal. per hour and embracing all the characteristics of sturdiness, economy of operation, ease of cleaning, and compactness found in the larger Impulsor. All parts of the machine that come into contact with emulsion are made of stainless steel. The Impulsor has been successfully employed in the preparation of pharmaceutical emulsions, having new and interesting characteristics for this class of product. Such widely varying products as sauces, salad creams, leather dressings, toothpaste and cosmetic creams, disinfectants, insecticides, tar emulsions and various wax preparations are also numbered among the successful products of the Impulsor emulsifier.

Electrical Ebonite

A New British]Standard Specification

THE third edition of the British Standards Institution specification for ebonite(B.S.S. No. 234 of 1933) has recently become available, and shows some interesting changes as compared with the 1931 edition. In the first place, the use of accelerators and loading materials is no longer prohibited, but excessive proportions of such substances are prevented indirectly by the electrical tests. Consequently, although the composition of the ebonite is no longer specified, compliance with the tests ensures that the material is substantially composed of good-quality raw rubber and sulphur. Some changes have also been made in the permissible impurities, mechanical strength and electric strength. Modifications have been introduced in the technique of certain of the tests. Copies of this specification may be obtained from the Institution, price 2s. 2d., post free.

Chemical Industry Lawn Tennis Tournament

Second Round Results: Third Round Draw

THE second round matches in the third annual Chemical Industry Lawn Tennis Tournament were concluded last week-end, and the draw for the third round was completed at THE CHEMICAL AGE offices on Tuesday. The results of the second round matches are given below.

SINGLES.

C. G. Copp (Doulton and Co., Ltd.) beat W. J. Sharman (Williams (Hounslow), Ltd.), 6—2, 6—0.

D. Blow (British Drug Houses, Ltd.) beat A. Tickner (British Celanese, Ltd.), 6—0, 6—4.

L. Giltrow (Williams (Hounslow), Ltd.) beat S. B. Perridge (Brandhurst Co., Ltd.), 6—3, 6—4.

A. Collins (British Oxygen Co., Ltd.) beat J. Wilson (British Celanese, Ltd.), 6—2, 6—3.

W. L. Alldis (Brandhurst Co., Ltd.) beat R. S. Law (Howards and Sons, Ltd.), 2—6, 6—3, 6—0.

R. C. Pennington (J. Crosfield and Sons, Ltd., Warrington) beat P. A. Tunstall (Salt Union, Ltd., Liverpool), 6—0, 6—0.

R. George (J. Crosfield and Sons, Ltd., Warrington) beat I. Williams (Monsanto Chemical Works, Ltd., Ruabon), 6—3, 6—4.

L. F. Grape (Borax Consolidated, Ltd.) beat E. A. Thomsett (British Oxygen Co., Ltd.), 7—5, 4—6, 6—4.

DOUBLES.

L. Giltrow and G. F. Hammond (Williams (Hounslow), Ltd.) beat A. Collins and H. Sibley (British Oxygen Co., Ltd.), 6—2, 7—9, 6—4.

R. C. Pennington and R. George (J. Crosfield and Sons, Ltd., Warrington) beat W. B. Miller and G. Lord (British Celanese, Ltd., Derby), 6—3, 6—0.

L. F. Grape and A. F. Childs (Borax Consolidated, Ltd.) beat J. Wilson and A. Tickner (British Celanese, Ltd.), 6—2, 6—4.

J. Haines and F. G. Hawley (Anglo-Persian Oil Co.) beat R. Welsh and E. Thomsett (British Oxygen Co., Ltd.), 6—0, 6—0.

W. L. Alldis and S. B. Perridge (Brandhurst Co., Ltd.) walk-over; N. Hogg and H. Short (Riley, Harbord and Law), scratched.

J. W. Urban and H. Barningham (Monsanto Chemical Works, Ltd.) beat H. W. Drew and W. G. Baldock (Williams (Hounslow), Ltd.), 6—4, 6—0.

V. J. Prosser (John Haig and Co., Ltd.) and A. Baxter (United Yeast Co., Ltd.) beat W. J. Sharman and H. R. Whittaker (Williams (Hounslow), Ltd.), 6—4, 6—2.

R. F. Porter and R. S. Law (Howards and Sons, Ltd.) beat E. C. Keeley and G. H. Trigg (Bovril, Ltd.), 2—6, 7—5, 6—3.

The Third Round Draw

Details of the third round draw are as follows. All third round matches must be played by **Monday, July 31,** and the results, signed by all players (winners and losers) must be forwarded to reach the Editor of THE CHEMICAL AGE not later than 9.30 a.m. on Tuesday, August 1. A summary of the rules, so far as they govern the third round of the tournament, is reproduced.

Rules

The competition shall be conducted on the knock-out principle, and the best of three advantage sets shall be played in all matches, except in the Final of the Singles, when the best of five sets shall be played.

The Editor of THE CHEMICAL AGE shall have the right to scratch any players who fail to play off their matches by the stipulated dates, or who otherwise fail to conform with the rules and regulations governing this competition.

Except in the case of the special period set apart for the final stages of the competition, players drawn against each other must make their own arrangements for playing off their match on a court mutually agreed upon. In the event of disagreement, the first name drawn shall have the right to choose the ground.

The result of each match must be sent by the winners to the Editor of THE CHEMICAL AGE, signed by all players (winners and losers) immediately after the match, and must reach the office of THE CHEMICAL AGE not later than by the first post on the day following the final day for playing off the round.

If any player be not present at the agreed place or time of the match, opponents shall be entitled to a walk-over, after having allowed reasonable time (say, a maximum of one hour) for the others' appearance. If the players find it impossible to play off their match on the day originally chosen, they must play it on any other day, to which both sides agree, within the stipulated period.

Any dispute arising between players, or otherwise, shall be referred to the arbitration of the Editor of THE CHEMICAL AGE, whose decision shall be final.

While competitors will make their own arrangements as to hard or grass courts for the preliminary rounds, it must be understood that the Finals will be played on hard courts.

SINGLES.

Giltrow, L. Williams (Hounslow), Ltd., Hounslow. (Hounslow 2929.)	*v*	**Copp, C. G.** Doulton & Co., Ltd., 28, High Street, Lambeth, London, S.E.1. (Reliance 1241.)
George, R. J. Crosfield & Sons, Ltd., Bank Quay, Warrington. (Warrington 800.)	*v*	**Blow, D.** The British Drug Houses, Ltd., Graham Street, City Road, London, N.1. (Clerkenwell 3000.)
Grape, L. F. Borax Consolidated, Ltd., 16, Eastcheap, London, E.C. (Royal 1450.)	*v*	**Alldis, W. L.** Brandhurst Co., Ltd., Vintry House, Queen Street Place, London, E.C.4. (Central 1411.)
Pennington, R. C. J. Crosfield & Sons, Ltd., Bank Quay, Warrington. (Warrington 800.)	*v*	**Collins, A.** British Oxygen Co., Ltd., Angel Road, Edmonton, London. (Tottenham 2647.)

DOUBLES.

Urban, J. W., & **Barningham, H.** Monsanto Chemical Works, Ltd., Victoria Station House, London, (Victoria 1535.)	*v*	**Giltrow, L.,** & **Hammond, G. F.** Williams (Hounslow), Ltd., Hounslow. (Hounslow 2929.)
Grape, L. F., & **Childs, A. F.** Borax Consolidated, Ltd., 16, Eastcheap, London. (Royal 1450.)	*v*	**Pennington, R. C.** & **George, R.** J. Crosfield & Sons, Ltd., Bank Quay, Warrington. (Warrington 800.)
Alldis, W. L., & **Perridge, S. B.** Brandhurst Co., Ltd., Vintry House, Queen Street Place, London, E.C.4. (Central 1411.)	*v*	**Porter, R. F.,** & **Law, R. S.** Howards & Sons, Ltd., Ilford, Essex. (Ilford 1113.)
Prosser, V. J., John Haig & Co. Ltd., 2 Pall Mall East, London (Whitehall 1040), & **Baxter, A.,** United Yeast Co., Ltd., 238, City Road, London. (Clerkenwell 0303).	*v*	**Haines, J.,** & **Hawley, F. G.** Anglo-Persian Oil Co., Britannic House, Finsbury Circus, London, E.C.2. (National 1212.)

Bengal Tanning Industry

Prosperity of Small Undertakings

ACCORDING to the Superintendent of the Bengal Tanning Institute, the most outstanding feature of the past year in the Bengal tanning and leather industry was the large increase of small scale and cottage tanning in Calcutta. The old small tanneries substantially increased their outputs and several new tanneries were started which were also quite busy. The small chrome tanners were responsible for the production of nearly £90,000 worth of chrome upper leather. The larger tanneries did not fare so well as the small concens, because of the falling off of demand for the better class articles they manufactured. They also failed to compete with the cottage workers in low quality goods. Considerable progress has been made in research work at the Tanning Institute.

The main problem before the trade is how to manufacture a leather which would be so cheap as to be within the reduced purchasing power of the public. The small tanners partially solved the problem by making and putting on the market an insufficiently tanned crude leather. The larger tanneries, which had established a reputation for a standard of quality, would not make crude leather and their problem was to cheapen the cost of production. Investigations carried out so far with a view to assist them, have given promising results. In the chemical section, laboratory experiments for the sulphonation of cod oil and preparation of fat liquor from the sulphonated product have yielded results, which are considered satisfactory.

Dinner to Professor E. Gibbs

Ramsay Laboratory's Second Anniversary

ON Friday, June 30, some forty-two members of the staff and students of the Ramsay Laboratory entertained Professor W. E. Gibbs to dinner. The occasion marked the successful conclusion of the second year of the occupation of the new building. In spite of the spacious accommodation that is now provided, the rapid growth of interest in chemical engineering has led already to discussion of plans for further expansion, as the number of students for which the present building is designed has nearly been reached.

The dinner was a pleasant anti-climax to the Diploma examinations which were held on Thursday and Friday. In proposing the toast to Professor Gibbs, Captain A. I. Wynne-Williams said that this was their first social event, and marked a step forward in the development of the Ramsay Laboratory. The growth of chemical engineering education and the widespread realisation of the chemical engineer's place in industry had been due in no small part to the advocacy of Professor Gibbs. Professor Gibbs, in his reply, paid a tribute to his staff and hoped that such a gathering might be an annual event, bringing together past and present workers in the laboratory.

After dinner a varied and topical entertainment was enjoyed. Professor Gibbs read an amusing paper on "The Discovery of a Rare Gas in Cheese," and the evening was brought to a close by the singing of students' songs, suitably "adapted."

Industrial Lecithin

Its Application in Confectionery

LECITHIN and its industrial application in the form of Collabrac, as manufactured by A. Boake, Roberts and Co., Ltd., is discussed in a new brochure issued by this firm. The remarkable action of Collabrac on the plasticity or viscosity of such substances as chocolate is most probably associated with its property of lowering the interfacial tension at the boundary between the cocoa butter and the other components. The lecithin acting as an emulsifying agent concentrates at the interface, which is described as adsorption. Physiologically lecithin is regarded as a highly concentrated form of food especially effective in nervous complaints. It can be administered in quite large doses with very favourable results, such as increase in body weight.

"Bloom" in Chocolates

The ever present menace of fat bloom causes considerable concern to all connected with chocolate. "Bloomed" chocolates are regarded with suspicion as to their wholesomeness, by the public, although they may be of comparatively recent manufacture. The cause normally lies more with the treatment of the chocolate than with any constituent. Since cocoa butter constitutes one third of chocolate, unless the preliminary temperature reduction and stirring are correct, also the subsequent covering and cooling conditions, a fraction of the cocoa butter will be in an unstable form. Later, dependent on fluctuations of temperature in storage, the unstable non-crystalline fat will crystallise, with the evolution of latent heat, giving the dull grey appearance known as fat-bloom. The result is that if conditions of manufacture are not correct, nothing can prevent this type of bloom. However, the incorporation of Choc-Collabrac lessens the possibility of fat-bloom by a slight alteration of the softening temperature of the cocoa-butter, making the chocolate less susceptible to changes of temperature.

To illustrate the effect of Collabrac on the dispersion of fat through a sugar batch, which has been brought to the boil, 10 per cent. of a refined coconut fat was added, the stirring gear was lowered into the pan and set in motion. Even after prolonged agitation, as soon as the stirring was stopped, a film of fat appeared on the top of the batch. A small percentage of Collabrac dissolved in a little fat was added and the fat film disappeared into the batch. When the batch was pitched on the slab it set up without a sign of grease. The finished sweet showed no tendency to stick to the teeth while chewing.

British Standards Institution

New Specification for Concrete Slabs

ARCHITECTS and builders will welcome the issue, by the British Standards Institution, of a British standard specification for precast concrete solid partition slabs which should do much to raise and maintain the quality of these materials generally. Slabs which comply with the requirements of this specification will not give rise to the troubles of which so many users in the past have complained. The sizes specified do not coincide exactly with existing trade practice and as they entail some alteration to manufacturers' plant it is provided that they shall not become generally operative until 1935. In addition to the general specification clauses, tests are included to determine transverse strength, drying shrinkage, moisture movement, loss on ignition and density. Notes on suggested methods of test for clinker aggregates which will be of assistance to manufacturers in making British standard slabs are included.

With regard to the cost of carrying out the specification tests the interests of the user and manufacturer are met in a standard form of clause which is being adopted generally in standard specifications. This calls for the supplier to bear the cost of the tests in the event of the results indicating that the material does not comply with the specification and places the charge on the purchaser where the goods conform to the requirements. Copies of the new specification (No. 492-1933) can be obtained from the Publications Department, British Standards Institution, 28 Victoria Street, London, S.W.1, price 2s. 2d., post free.

The Institution is now engaged in preparing British standard specfications for precast concrete hollow partition slabs and precast concrete hollow walling blocks.

Training for Chemistry

The Problem of Premium Pupils

AN appeal is addressed to Fellows and Associates of the Institute of Chemistry in the current issue of the Institute Journal to assist in making known the most satisfactory means of preparation for the chemical profession, and to do everything in their power to dissuade parents from signing articles with inadequately qualified chemists, especially as the training given in many polytechnics and institutions is now of a very high standard and can be obtained for less than the sum paid under certain apprenticeships.

From time to time the Institute receives applications or inquiries from candidates who, in the opinion of the Council, have been misdirected as to their preparation for professional life. While many young men who desire to follow chemistry may not be possessed of the necessary means to enter on the full day courses of a university career, and can only become qualified by taking evening classes while earning their living during the daytime, there are some who, unfortunately, rely on training received as premium pupils in the laboratories of analysts who cannot provide the full training necessary, or, indeed, any training which will lead to a degree or other recognised qualification. They may find, therefore, that they have wasted valuable time, and are thereby deprived of any prospect of success unless they are in a position to make a fresh start.

It is deplored that often such pupils have not even matriculated before entering on their articles. The system, which seems difficult to check, because it is not illegal, amounts, in some cases, to an abuse similar to that revealed by Dickens in his character of Mr. Squeers of Dotheboys Hall. The attention of the Institute has recently been directed to a case where a young man of twenty-one years of age called upon a Fellow in order to seek employment in the laboratory of a large firm. His training had consisted solely of two years' apprenticeship with an analytical chemist in independent practice, not a member of the Institute, and had obviously been of a very superficial character. Chemists who obtain degrees and the Associateship of the Institute may frequently find it advisable to pay premiums in order to gain specialised knowledge and experience in particular branches of chemical work, but students, at the beginning of their careers, should be advised to matriculate and to enter upon systematic courses at recognised universities or colleges.

News from the Allied Industries

Artificial Silk

THE output of artificial silk in the United Kingdom for May was 7,170,000 lb., compared with 5,160,000 lb. for April, and 6,090,000 lb. for May, 1932.

Matches

THE ANNUAL meeting of the Swedish Match Co. was held at Jonkoping on June 27. The accounts and the board's proposal regarding the writing off of the loss of 552,800,000 kroner (approximately £26,140,00) were approved. M. Prytz, the chief director, replying to a shareholder, stated that the proceedings against the members of the old board were before the Town Hall Court in Stockholm, and a number of complicated questions were involved. Provisional negotiations had, however, been opened with a few of the members of the old board with a view to possible compromise arrangements in special cases where such might be in accordance with the interests of the company. It was decided that the new board should consist of twelve members, and among those elected were two English representatives, Mr. W. Carter and Mr. C. L. Lambert. Mr. F. Thompson, of Price, Waterhouse and Co., was elected one of the auditors.

Mineral Oil

ALTHOUGH the past year has been exceptionally difficult for the oil industry, due to the heavy excess of production over consumption, the Phœnix Oil and Transport Co. reports substantially higher earnings. To obtain that satisfactory result, however, the company has been forced to increase its output, thereby offsetting, as far as possible, the prevailing low prices. Net profit, arrived at after providing within the group the full amount of depreciation called for under the scheme arranged with the auditors, amounts to £162,473, compared with £149,449 reported for 1931. Dividends are to be resumed after a lapse of one year, the directors recommending a distribution of 6d. per share on the £1 shares, and the relative payment of 3.463,897d. on each of the 1s. shares, which will absorb £107,770. The allocation to the investment reserve is reduced from £200,000 to £100,000, leaving a balance of £137,227 to be carried forward, against £182,524 brought in. The group's production of crude oil for the year amounted to 823,217 tons, which compares with 687,023 tons for 1931.

Iron and Steel

IN June, 1931, when the heavy industries of the country were most depressed, the staff of the United Steel Companies, Ltd., Sheffield, accepted certain salary reductions. In January, 1933, it was found possible to restore 25 per cent. of the reduction, and now, having regard to some improvement in trade and the fuller working of the companies' plants, it has been found possible to restore a further 25 per cent. of the reduction. The directors have addressed a letter to each member of the staff expressing their appreciation of the efforts which are being made to enable the companies to take advantage of the improvement in trade which has shown itself during the last few months.

SHAREHOLDERS of Dorman, Long and Co., Ltd., and the South Durham Steel and Iron Co., Ltd., have this week received particulars of the proposed amalgamation of the two companies. The scheme involves a financial reconstruction of Dorman, Long and Co., including the writing down of capital by more than £9,000,000, the amalgamation of this company with the South Durham Steel and Iron Co., which includes the Cargo Fleet Iron Co., Ltd., and the provision of fresh finance to carry out the scheme, and to provide additional working capital necessary to meet the requirements of the reorganised company. The scheme is the outcome of the most careful thought and the willing co-operation of the respective boards, the interested banks, together with the help of the Bankers Industrial Development Co., Ltd., and other financial interests. In order to provide the cash for payments to the South Durham and Cargo Fleet Debenture holders and shareholders, and also to provide additional working capital, the new company is to create £2,500,000 5 per cent. redeemable prior lien stock and issue an amount not exceeding £2,230,000. The Bankers Industrial Development Co. has arranged for the necessary finance to be obtained through a syndicate.

China Clay

REFERENCE was made in these columns on June 17 to the appointment by English Clays Lovering Pochin and Co., Ltd., of Mr. R. J. Davies as "the first research worker in the china clay industry." The Dartmoor China Clay Co., Ltd., of Plympton, however, claims credit for pioneer work in this connection, and informs us that that company has employed Mr. T. W. Parker for the past nine years on research work connected with the industry.

Rubber

ACCORDING to the monthly analysis issued by the Rubber Growers' Association the output of 615 rubber producing companies in May was 20,488 tons, against 19,011 tons in April and 20,890 tons in May last year. Expressed as an index number based on the monthly average for 1929 = 100, these outputs represent 91.6, 85.0 and 93.4 respectively. For the first five months of 1933 the total output is 98,851 tons, against 105,580 tons in the similar period of 1932.

Sugar

RAPID developments of the sugar industry in India have produced a situation of international importance, and the Government of India has called a conference of sugar-growing States and Provinces which is to be held at Simla on July 10. In the 1931-32 season 30 factories were working in India, in 1932-33 some 27 new factories came into operation, and the Sugar Federation of the British Empire has received information that 53 new factories are in course of construction for the present season, 1933-34. Calculating the prospective outputs of the 110 factories, the federation estimates that they are capable of a production this season of 950,000 tons, equal to the total Indian home and import requirements last year. The Chadbourne plan for restricting exports from the eight exporting countries of the world, did not visualise India becoming self-contained and ceasing to be an importing country. Hence India has suddenly become of international importance in the sugar markets. Points to be discussed at next week's conference are:—(1) Means to protect the cultivator against exploitation; (2) licensing of factories; (3) fixation of prices; and (4) zoning of areas.

Dyeing and Finishing

IN a circular to shareholders the directors of the Bradford Dyers' Association, referring to their decision to postpone the payment of a dividend on the 5 per cent. cumulative preference stock due July 1, state that the present uncertainty as to the course of trade and the existing disturbed world conditions render it inadvisable to make the large draft upon the association's reserves which the payment would entail. By the end of the year more information will be available as to the results of the current year's trading, and it is hoped that a position of greater stability may have been reached in world affairs. The dividend is cumulative.

A NEW wages agreement following negotiations between employers and representatives of the Amalgamated Society of Dyers, Bleachers, Finishers, and Kindred Trades—arising out of a temporary stoppage of work in the dyeing and cleaning industry in Scotland—provides for (1) a wage based on a cost of living figure 14 points higher than the present official index figure of 36; (2) a 47-hour working week; (3) a minimum wage ranging from 47s. to 66s. per week for adult males, to be paid all the year round to every worker with four years' service in the trade; (4) a guaranteed minimum of 75 per cent. of the basic rates when working short-time to other operatives with less than four years' service in the trade; (5) payment for holidays for all workers; and (6) the limitation of overtime to nine hours in any week and the establishment of a maximum working week of 56 hours.

CHEMICALLY pure sulphuric acid has been produced in Poland only intermittently and manufacture was recently abandoned. It is reported that the Polish-Belgian Chemical Establishments "Polchem" in Torun have completed the building of an installation for the production of chemically pure sulphuric acid. The first shipment from the Torun plant will probably be on the market in the coming summer.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

The following market report is based on information supplied by the British manufacturers concerned, and unless otherwise qualified the figures quoted apply to fair quantities, net and naked at makers' works. Where no locality is indicated, the prices are general for the United Kingdom. Particulars of the London chemical market are specially supplied to The Chemical Age by R. W. Greeff and Co., Ltd., and Chas. Page and Co., Ltd., and those of the Scottish chemical market by Chas. Tennant and Co., Ltd.

Prices continue firm and there is a good steady demand. There is a good call for coal tar products and supplies are fairly fully sold for forward delivery. Prices generally remain firm. Up to the present buying interest on the Manchester chemical market has not shown much seasonal falling off and this week sellers have reported a fair volume of inquiry, with actual business, however, tending to be restricted in most instances to relatively near delivery dates. So far as prices are concerned, there has been little change in the general situation and the few alterations that have occurred since last report have been in an upward direction. The Scottish heavy chemical market has been rather quieter during the past week.

General Chemicals

Acetone.—London : £65 to £68 per ton; Scotland : £66 to £68 ex wharf, according to quantity.

Acid, Acetic.—Tech. 80%, £38 5s. to £40 5s.; pure 80% £39 5s.; tech., 40%, £20 5s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. London : Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s. to £41 5s.; tech., 40%, £20 5s. to £22 5s.; tech., 60%, £29 5s. to £31 5s. Scotland : Glacial 98/100%, £48 to £52; pure 80%, £39 5s.; tech. 80%, £38 5s. d/d buyers' premises Great Britain. Manchester : 80%, commercial, £39; tech. glacial, £52.

Acid, Boric.—Scotland : Granulated commercial, £26 10s. per ton; B.P. crystals, £35 10s.; B.P. powder, £36 10s. in 1-cwt. bags d/d free Great Britain in 1-ton lots upwards.

Acid, Chromic.—11d. per lb., less 2½%, d/d U.K.

Acid, Citric.—London : 9½d. per lb.; less 5%. Manchester : 9½d.

Acid, Cresylic.—97/99%, 1s. 1d. to 1s. 7d. per gal.; 98/100%, 1s. 5d. to 2s.

Acid, Formic.—London : £47 10s. per ton.

Acid, Hydrochloric.—Spot, 3s. 9d. to 6s. carboy d/d according to purity, strength and locality. Scotland : Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

Acid, Lactic.—Lancashire : Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £48; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

Acid, Nitric.—80° Tw. spot, £18 to £25 per ton makers' works, according to district and quality. Scotland : 80°, £23 ex station full truck loads.

Acid, Oxalic.—London : £47 7s. 6d. to £57 10s. per ton, according to packages and position. Scotland : 98/100%, £49 to £52 ex store. Manchester : £48 to £54 ex store.

Acid, Sulphuric.—Average prices f.o.r. British makers' works, with slight variations owing to local considerations; 140° Tw. crude acid, £3 per ton; 168° Tw. arsenical £5 10s.; 168° Tw. non-arsenical, £6 15s. Scotland : 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

Acid, Tartaric.—London : 11½d. per lb. Scotland : B.P. crystals, 11d., carriage paid. Manchester : 11¾d. to 1s.

Alum.—Scotland : Lump potash, £9 per ton ex store.

Alumina Sulphate.—London . £8 5s. to £9 10s. per ton. Scotland : £8 to £8 10s. ex store.

Ammonia, Anhydrous.—Spot, 10d. per lb. d/d in cylinders. Scotland : 10d. to 1s. containers extra and returnable.

Ammonia Liquid.—Scotland : 80°, 2½d. to 3d. per lb., d/d.

Ammonium Bichromate.—8d. per lb. d/d U.K.

Ammonium Carbonate.—Scotland : Lump, £32 per ton; powdered, £34, in 5-cwt. casks d/d buyers' premises U.K.

Ammonium Chloride.—£37 to £45 per ton, carriage paid. London : Fine white crystals, £19 to £20. (See also Salammoniac.)

Ammonium Chloride (Muriate).—Scotland : British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

Antimony Oxide.—Scotland : Spot, £24 per ton, c.i.f. U.K. ports.

Antimony Sulphide.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

Arsenic.—London : £19 c.i.f. main U.K. ports for imported material; Cornish nominal, £23 f.o.r mines. Scotland : White powdered, £23 ex wharf. Manchester : White powdered Cornish, £23 at mines.

Arsenic Sulphide.—Yellow, 1s. 5d. to 1s. 7d. per lb.

Barium Chloride.—£11 per ton.

Bisulphite of Lime.—£6 10s. per ton f.o.r. London.

Bleaching Powder.—Spot 35/37% £7 19s. per ton d/d station in casks, special terms for contract. Scotland : £8 15s. in 5/6 cwt. casks.

Borax, Commercial.—Granulated, £15 10s. per ton; powder, £17 packed in 1-cwt. bags, carriage paid any station Great Britain. Prices are for 1-ton lots and upwards.

Cadmium Sulphide.—2s. 9d. to 3s. 1d.

Calcium Chloride.—Solid 70/75% spot, £5 5s. per ton d/d station in drums.

Carbon Bisulphide.—£30 to £32 per ton, drums extra.

Carbon Black.—3¼d. to 4¾d. per lb., ex wharf.

Carbon Tetrachloride.—£41 to £46 per ton, drums extra.

Chromium Oxide.—10d. to 10½d. per lb., according to quantity d/d U.K. Green, 1s. 2d. per lb.

Chrometan.—Crystals, 3½d. per lb. Liquor, £19 10s. per ton d/d

Copperas (Green).—Scotland : £3 15s. per ton, f.o.r. or ex works.

Cream of Tartar.—London : £4 per cwt.

Diphenylguanidine.—2s. 2d. per lb.

Formaldehyde.—London : £28 per ton. Scotland : 40%, £28 ex store.

Lampblack.—£45 to £48 per ton.

Lead Acetate.—London : White, £34 per ton; brown, £1 per ton less. Scotland : White crystals, £34 to £36; brown, £1 per ton less. Manchester : White, £32; brown, £29 10s.

Lead Nitrate.—£28 per ton.

Lead, Red.—Scotland : £24 to £26 10s. per ton d/d buyer's works.

Lead, White.—Scotland : £39 per ton, carriage paid.

Lithopone.—30%, £17 10s. to £18 per ton.

Magnesite.—Scotland : Ground Calcined £9 per ton ex store.

Methylated Spirit.—61 O.P. Industrial 1s. 8d. to 2s. 3d. per gal. Pyridinised Industrial, 1s. 10d. to 2s. 5d. Mineralised, 2s. 9d. to 3s. 3d. 64 O.P. 1d. extra in all cases. Prices according to quantities. Scotland : Industrial 64 O.P., 1s. 9d. to 2s. 4d.

Nickel Ammonium Sulphate.—£49 per ton d/d.

Nickel Sulphate.—£49 per ton d/d.

Phenol.—9d. to 10d. per lb. nominal.

Potash, Caustic.—London : £42; Manchester : £41.

Potassium Bichromate.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5¾d. London : 5d. per lb. with usual discounts for contracts. Scotland : 5d. d/d U.K. or c.i.f. Irish Ports. Manchester : 5d.

Potassium Chlorate.—London : £37 to £40 per ton. Scotland : 99¾/100% powder, £37. Manchester : £38.

Potassium Chromate.—6½d. per lb. d/d U.K.

Potassium Nitrate.—Scotland : Refined Granulated £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

Potassium Permanganate.—London : 8½d. per lb. Scotland : B.P. crystals, 8½d. Manchester : Commercial, 8¼d. B.P., 8¾d.

Potassium Prussiate.—London : 8½d. to 9d. per lb. Scotland : Yellow spot material, 8½d. ex store. Manchester : Yellow, 8½d.

Salammoniac.—First lump spot, £42 17s. 6d. per ton d/d in barrels.

Soda Ash.—58% spot, £5 17s. 6d. per ton f.o.r. in bags, special terms for contracts.

Soda, Caustic.—Solid 76/77° spot, £14 5s. per ton d/d station. Scotland : Powdered 98/99%, £17 10s. in drums, £18 15s. in casks, Solid 76/77%, £14 10s. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. Manchester : £13 5s. to £14 10s. contracts.

Soda Crystals.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

Sodium Acetate.—£22 per ton. London : £23.

Sodium Bicarbonate.—Refined spot, £10 10s. per ton d/d station in bags. Scotland : Refined recrystallised £10 10s. ex quay or station. Manchester : £10 10s.

Sodium Bichromate.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous, 5d. per lb. London : 4d. per lb. with discounts for quantities. Scotland : 4d. delivered buyer's premises with concession for contracts. Manchester : 4d. less 1 to 3½% contracts, 4d. spot lots.

Sodium Bisulphite Powder.—60/62%, £16 10s. per ton d/d 1-cwt. iron drums for home trade.

Sodium Carbonate (Soda Crystals).—Scotland : £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

Sodium Chlorate.—£32 per ton.

Sodium Chromate.—3⅜d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND : Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £15 ex station, 4-ton lots. MANCHESTER : Commercial, £9 5s.; photographic, £15.
SODIUM NITRITE.—LONDON : Spot, £18 to £20 per ton d/d station in drums.
SODIUM PERBORATE.—LONDON : 10d. per lb.
SODIUM PHOSPHATE.—£12 10s. per ton.
SODIUM PRUSSIATE.—LONDON : 5d. to 5½d. per lb. SCOTLAND : 5d. to 5¾d. ex store. MANCHESTER : 4¾d. to 5¾d.
SODIUM SILICATE.—140° Tw. Spot £8 5s. per ton d/d station, returnable drums.
SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d. SCOTLAND : English material £3 15s.
SODIUM SULPHATE (SALT CAKE).—Unground Spot, £3 15s. per ton d/d station in bulk. SCOTLAND : Ground quality, £3 5s. per ton d/d. MANCHESTER : £3 5s.
SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND : For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER : Concentrated solid, 60/62%, £11; commercial, £8.
SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot, £9 10s. d/d station in bags.
SULPHATE OF COPPER.—MANCHESTER : £17 per ton f.o.b.
SULPHUR.—£11 10s. per ton. SCOTLAND : Flowers, £11; roll, £10 10s.; rock, £9; ground American, £10 ex store.
SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.
SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.
VERMILION.—Pale or deep, 4s. 3d. to 4s. 5d. per lb.
ZINC CHLORIDE.—SCOTLAND : British material, 98%, £18 10s. per ton f.o.b. U.K. ports.
ZINC SULPHATE.—LONDON AND SCOTLAND : £12 per ton.
ZINC SULPHIDE.—11d. to 1s. per lb.

Pharmaceutical and Fine Chemicals

ACID, CITRIC.—9½d. per lb.
ACID, TARTARIC.—11¾d. per lb., less 5%.
CADMIUM IODIDE.—14s. 6d. per lb.
IRON AMMON. CITRATE.—B.P., 1s. 9d. per lb.; green, 2s. 5d. per lb.
IRON QUININE CITRATE.—9¾d. to 1s. 0½d. per oz.
LINALOL (ex Shui oil).—5s. 9d. per lb.
MENTHOL.—A.B.R. recryst., B.P., 15s. per lb.; synthetic detached crystals, 8s. 6d. to 10s. 6d. per lb.
PHENACETIN.—4s. to 4s. 6d. per lb.
POTASSIUM BITARTRATE., 99/100% (Cream of tartar).—£4 per cwt.
POTASSIUM CITRATE.—B.P., 1s. 7d. per lb.
SODIUM BARBITONUM.—13s. to 15s. per lb.
SODIUM CITRATE.—B.P.C., 1911, 1s. 4d. per lb.; B.P.C., 1932, and U.S.P., 1s. 8d. per lb.
SODIUM POTASSIUM TARTRATE (Rochelle sale).—£3 10s. per cwt.
TARTAR EMETIC, B.P.—3s. 9d. to 4s. 6d. per lb.

Essential Oils

ALMOND, FOREIGN, S.P.A.—9s. per lb.
BERGAMOT.—6s. 6d. per lb.
BOURBON GERANIUM.—25s. 3d. per lb.
LAVENDER, MONT BLANC, 38/40%.—10s. per lb.
LEMONGRASS.—3s. per lb.
PEPPERMINT, JAPANESE.—6s. 6d. per lb.
SANDALWOOD, AUSTRALIAN, B.P. and French Codex, 92/95%, 15s. 6d. per lb.

Intermediates and Dyes

IN the following list of intermediates delivered prices include packages except where otherwise stated :—
ACID, BENZOIC, 1914 B.P. (ex Toluol).—1s. 9½d. per lb.
ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.
ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.
ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100% d/d buyer's works.
ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.
ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.
BENZIDINE BASE.—Spot, 2s. 5d. per lb. 100% d/d buyer's works.
p-CRESOL 34-5° C.—1s. 9d. per lb. in ton lots.
m-CRESOL 98/100%.—2s. 3d. per lb. in ton lots.
DICHLORANILINE.—2s. 3d. per lb.
DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.
DINITROBENZENE.—8d. per lb.
DINITROTOLUENE.—48/50° C., 8d. per lb.; 66/68° C. 8¾d. per lb.
DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.
α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.
β-NAPHTHOL.—Spot, £78 15s. per ton in paper bags; £79 15s. in casks, in 1-ton lots.
α-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.
β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works .
o-NITRANILINE.—5s. 10d. per lb.
m-NITRANILINE.—Spot, 2s. 7d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 4½d. per lb.; 5-cwt. lots, drums extra.
NITRONAPHTHALENE.—9d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.
o-TOLUIDINE.—Spot, 9½d. per lb., drums extra, d/d buyer's works.
p-TOLUIDINE.—Spot, 1s. 11d. per lb., d/d buyer's works.
m-XYLIDINE ACETATE.—3s. 4d. per lb.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 9d. to 10d. per lb.; crude, 60's, 2s. 5d. to 2s. 6d. per gal.; 2% water 3s. 0¾d. MANCHESTER : Crystals, 9¼d. per lb.; crude, 2s. 6d. per gal. SCOTLAND : 60's, 1s. 7d. to 1s. 8d.
ACID, CRESYLIC.—99/100%, 11d. to 1s. 8d. per gal.; pale 95%, 11d. to 11½d.; dark, 10d., all according to specification; refined, 1s. 7d. to 1s. 8d. LONDON : 98/100%, 1s. 3d.; dark, 95/97%, 11d. SCOTLAND : Pale 99/100%, 1s. 3d. to 1s. 4d.; 97/99%, 1s. to 1s. 1d.; dark 97/99%, 11d. to 1s.; high boiling acid, 2s. 6d. to 3s.
ANTHRACENE OIL.—Strained, 4½d. per gal.
BENZOL.—At works, crude, 9d. to 9½d. per gal.; standard motor 1s. 4d. to 1s. 4½d.; 90%, 1s. 5d. to 1s. 6d.; pure, 1s. 7½d. to 1s. 8d. LONDON : Motor, 1s. 7½d. SCOTLAND : Motor, 1s. 6½d. to 1s. 7½d.; 90%, 2s. 0½d. to 2s. 1½d.
CREOSOTE.—B.S.I. Specification standard, 3d. per gal. f.o.r. Home, 3¾d. d/d. LONDON : 3d. to 3¼d. f.o.r. North; 4d. to 4½d. London. MANCHESTER : 2d. to 3½d. SCOTLAND : Specification oils, 3½d. to 4d.; washed oil, 3½d. to 4d.; light, 3d. to 3½d.; heavy, 4½d. to 5d.
NAPHTHA.—Solvent, 90/160%, 1s. 4d. to 1s. 5d. per gal.; 95/160%, 1s. 7d.; 90/190%, 9d. to 1s. 1d. LONDON : Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND : 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.
NAPHTHALENE.—Crude, Hot-Pressed, £6 1s. 3d. per ton. Flaked, £10 per ton. Purified crystals, £9 10s. per ton in bags. LONDON : Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND : 40s. to 50s.; whizzed, 70s. to 75s.
PITCH.—Medium soft, £4 per ton. MANCHESTER : £3 15s. f.o.b. LONDON : £4 to £4 2s. 6d. f.o.b. East Coast part.
PYRIDINE.—90/140, 4s. to 4s. 6d. per gal.; 90/180, 2s. to 2s. 6d. SCOTLAND : 90/160% 4s. to 5s.; 90/220%, 3s. to 4s.
REFINED COAL TAR.—SCOTLAND : 4d. per gal.
XYLOL.—Common, 1s. 11d. to 2s. per gal.; pure, 2s. 2d. to 2s. 3d.
TOLUOL.—90%, 2s. to 2s. 1d. per gal.; pure, 2s. 4d.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 15s. to £9 per ton. Grey £14 to £15. Liquor, brown, 30° Tw., 6d. per gal. MANCHESTER : Brown, £9 10s.; grey, £16.
ACETIC ACID, TECHNICAL, 40%.—£17 to £18 per ton.
AMYL ACETATE, TECHNICAL.—95s. to 110s. per cwt.
CHARCOAL.—£6 to £11 per ton.
WOOD CREOSOTE.—6d. to 2s. per gal., unrefined.
WOOD NAPHTHA, MISCIBLE.—2s. 7d. to 4s. per gal. Solvent, 3s. 9d. to 4s. 9d. per gal.
WOOD TAR.—£2 to £6 per ton.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—The price for the home market has been announced for July/August delivery in 6-ton lots to consumer's nearest station at £6 15s. per ton—terms and conditions of sale being unchanged from last year. This shows an advance of 5s. per ton on the spring price of £6 10s. The export price is now £6 5s. per ton for July shipment f.o.b. U.K. ports in single bags.

OTHER FERTILISERS.—No new prices for the 1933/34 season have yet been announced for other products, and it is assumed that until such prices are announced the prices which were in operation during June will remain in force.

Latest Oil Prices

LONDON, July 5.—LINSEED OIL was steady. Spot, small quantities, £23 15s.; July, £20 15s.; July-Aug., £20 17s. 6d.; Sept.-Dec., £21 10s., naked. RAPE OIL was quiet. Crude extracted, £29; technical refined, £30 10s., naked, ex wharf. COTTON OIL was firm. Egyptian crude, £22; refined common edible, £24 10s.; and deodorised, £26 10s., naked, ex mill. TURPENTINE was steady. American, spot, 52s. 3d. per cwt.

HULL.—LINSEED OIL.—Spot quoted £21 12s. 6d.; July, £21 2s. 6d.; July-Aug., £21 5s.; Sept.-Dec., £21 10s.; Jan.-April, £22 per ton. COTTON OIL.—Egyptian, crude, spot, £22; edible refined, spot, £23 10s.; technical, spot, £23 10s.; deodorised, spot, £25 10s., naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £20, naked. GROUNDNUT OIL.—Extracted, spot, £25; deodorised, £29. SOYA OIL.—Extracted, spot, £22 10s.; deodorised, spot, £25 10s per ton. COD OIL nominally quoted 19s. per cwt. CASTOR OIL.—Pharmaceutical, spot, 39s.; firsts, 34s.; seconds, 31s. per cwt. TURPENTINE.—American, spot, 54s. per cwt.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Accepted with Dates of Application

MANUFACTURE OF DYESTUFFS.—F. B. Dehn (Deutsche Hydrierwerke Akt.-Ges.) Sept. 11, 1931. 393,966.

TREATMENT OF ACYL, ALKYL, OR ARALKYL CELLULOSE DERIVATIVES.—Imperial Chemical Industries, Ltd., and L. G. Lawrie. Nov. 17, 1931. 393,985.

RECOVERY OF SULPHUR.—L. F. W. Leese. Dec. 1, 1931. 393,971.

PROCESS OF MIXING LIQUIDS OR LIQUIDS AND SOLIDS.—South Metropolitan Gas Co., H. Stanier and J. E. Davis. Dec. 1, 1931. 393,934.

MANUFACTURE OF BENZYL ETHERS.—Imperial Chemical Industries, Ltd., A. W. Baldwin and A. Davidson. Dec. 2, 1931. 393,937.

METHOD OF RELIEVING WASTE LIQUORS FROM THE SODA OR SULPHATE PULP MANUFACTURE OF SILICA.—E. L. Rinman. Oct. 26, 1931. (Addition to 26296/31.) 393,962.

PRODUCTION OF SUBSTITUTION PRODUCTS OF ACID NITRILES.—K. Ziegler. Dec. 18, 1930. 393,955.

PRIMING COMPOSITIONS.—Imperial Chemical Industries, Ltd., and A. Weale. Dec. 14, 1931. 393,956.

RECOVERY OF HYDROCYANIC ACID FROM COMPLEX CYANIDES AND WASTE LIQUORS.—H. L. Sulman and H. F. K. Picard. Dec. 18, 1931. 394,004.

PROCESS FOR THE MANUFACTURE OF BIS- (HALOGENHYDROXYARYL) -OXIDES.—I. G. Farbenindustrie. Dec. 23, 1930. 394,026.

MANUFACTURE OF AROMATIC AMINES AND COLOURED PIGMENTS.—I. G. Farbenindustrie. Dec. 24, 1930. 394,027.

MANUFACTURE AND PRODUCTION OF LUBRICATING OILS FROM FATS OR FATTY OILS.—J. Y. Johnson (I. G. Farbenindustrie). Feb. 26, 1932. 394,073.

PROCESS FOR DEHYDRATING ORGANIC LIQUIDS AND APPARATUS THEREFOR.—I. G. Farbenindustrie. March 30, 1931. 394,086.

PRODUCTION OF SUBSTITUTED PRODUCTS OF ACID NITRILES.—K. Ziegler. May 7, 1931. (Addition to 393,955.) 394,087.

PROCESS FOR THE MANUFACTURE OF THE GLUCOSIDES OF PHENOLS AND OF SUBSTANCES CONTAINING PHENOLIC HYDROXYL GROUPS.—B. Helferich. Oct. 16, 1931. 394,195.

MANUFACTURE OF SOLUTIONS OF FIBROIN.—I. G. Farbenindustrie. Oct. 24, 1931. 394,212.

PRODUCTION OF REGULINE FERROBORON.—I. G. Farbenindustrie. April 6, 1932. 394,275.

ANTHRAQUINONE DYESTUFFS AND THE APPLICATION THEREOF.—Imperial Chemical Industries, Ltd., N. H. Haddock and F. Lodge. Nov. 13, 1931. 394,312.

PROCESS AND APPARATUS FOR PRODUCING BLEACHING POWDER.—P. Pestalozza. Dec. 22, 1930. 394,373.

HYDRATION OF OLEFINES.—H. Dreyfus. Dec. 22, 1931. 394,375.

MANUFACTURE OF ADDITION PRODUCTS OF OLEFINES.—H. Dreyfus. Dec. 22, 1931. (Cognate application, 11415/32.) 394,376.

ALLOYS CONTAINING NICKEL AND METHODS OF PRODUCING THEM.—Mond Nickel Co., Ltd., (International Nickel Co., Inc.). Dec. 23, 1931. 394,378.

MANUFACTURE AND PRODUCTION OF PYRIDINE COMPOUNDS.—J. Y. Johnson (I. G. Farbenindustrie). Feb. 1, 1932. 394,416.

SEPARATION OF AMINES.—Röhm and Haas Co. May 18, 1931. 394,475.

PROCESS FOR PURIFYING SUGAR FACTORY AND REFINERY JUICES.—D. Teatini. July 23, 1931. 394,498.

MAGNESIUM BASE ALLOYS.—Dow Chemical Co. Feb. 1, 1932. 394,551.

MANUFACTURE OF 3.5-DIIODO-4-PYRIDONE.—I. G. Farbenindustrie. Dec. 20, 1930. (Divided application on 35122/31.) 394,387.

PROCESS FOR THE MANUFACTURE OF SOLUBLE CALCIUM SALTS AND PRODUCTS OBTAINED THEREBY.—Chemische Fabrik Vorm. Sandoz. Dec. 30, 1931. 394,596.

MANUFACTURE OF DYESTUFFS.—F. B. Dehn (Deutsche Hydrierwerke Akt.-Ges.). Sept. 11, 1931. (Divided application on 25582/31.) 394,343.

HYDRATION OF OLEFINES.—H. Dreyfus. Dec. 22, 1931. (Divided application on 35369/31.) 394,389.

Complete Specifications Open to Public Inspection

PRODUCTION OF ETHYLENE OXIDE, PARTICULARLY FOR THE PREPARATION OF ETHYLENE-GLYCOL AND OF ITS DERIVATIVES.—Soc. Française de Catalyse Généralisée. Dec. 19, 1931. 12579/32.

MANUFACTURE OF HIGH-MOLECULAR SULPHUR COMPOUNDS.—Henkel et Cie, Ges. Dec. 15, 1931. (Cognate applications.) 33410, 33411/32.

MANUFACTURE OF ESTERS AND THIC ESTERS SUBSTITUTED IN THE ACID RESIDUE. Henkel et Cie, Ges. Dec. 15, 1931. 34038/32.

MANUFACTURE OF AZO-DYESTUFFS.—Soc. of Chemical Industry in Basle. Dec. 17, 1931. 35446/32.

MANUFACTURE OF AQUEOUS SOLUTION OF AMINOACRIDINE SALTS.—I. G. Farbenindustrie. Dec. 16, 1931. 35701/32.

MANUFACTURE OF STABLE SOLUTIONS OF ANAESTHETIC SUBSTANCES.—I. G. Farbenindustrie. Dec. 17, 1931. 35702/32.

PROCESS FOR THE MANUFACTURE OF NEW AZO DYESTUFFS.—I. G. Farbenindustrie. Dec. 18, 1931. 35766/32.

PROCESS FOR THE PRODUCTION OF SULPHURIC ACID.—Metallgesellschaft Akt.-Ges. Dec. 18, 1931. (Cognate Applications.) 35942, 35943, 35944, 35945/32.

PROCESS FOR THE MANUFACTURE OF SODIUM NITRATE.—Norsk Hydro-Elektrisk Kvaelstofaktieselskab. Dec. 23, 1931. 16142/32.

MANUFACTURE OF NITROGENOUS DERIVATIVES OF THE ANTHRAQUINONE SERIES.—Soc. of Chemical Industry in Basle. Dec. 23, 1931. 32654/32.

PROCESS FOR THE MANUFACTURE OF MIXED ANHYDRIDES OF BORIC ACID AND ORGANIC ACIDS.—Henkel et Cie, Ges. Dec. 23, 1931. 34725/32.

PROCESS FOR THE MANUFACTURE OF STRONGLY BASIC PORPHINS AND PRODUCTS OBTAINED THEREBY.—Chemische Fabrik Vorm. Sandoz. Dec. 22, 1931. 36102/32.

PROCESS FOR THE MANUFACTURE OF ANHYDRIDES OF FATTY ACIDS.—Boehringer and Saehne Ges. Dec. 21, 1931. 36103/32.

PROCESS FOR THE PRODUCTION OF UNSATURATED HYDROCARBONS FROM HYDROCARBONS PROPORTIONATELY RICHER IN HYDROGEN.—Dr. F. Fischer and Dr. H. Uichler. Dec. 24, 1931. 36433/32.

PROCESS FOR THE MANUFACTURE OF NEW CONDENSATION PRODUCTS OF THE ANTHRAQUINONE SERIES.—I. G. Farbenindustrie. Dec. 23, 1931. 36532/32.

MANUFACTURE OF DIAZO DYESTUFFS INSOLUBLE IN WATER.—I. G. Farbenindustrie. Dec. 24, 1931. 36594/32.

Applications for Patents

CARRYING OUT CHEMICAL REACTIONS.—H. Birchall. June 19. 17458.

DISTILLATION OF CARBONACEOUS MATERIAL MIXED WITH OIL.—E. W. Brocklebank and W. B. Mitford. June 22. 17860.

MANUFACTURE OF HYDROGEN CHLORIDE.—Chemische Febrik Dr. H. Stoltzenberg. June 21. (Germany, June 22, '32.) 17707.

MANUFACTURE OF THORIUM OXIDE AND THORIUM SALTS.—Chemische Fabrik Von Heyden. June 22. 17813, 17814.

PRODUCTION OF ACTIVATED CARBON AND APPARATUS THEREFOR.—F. H. Cone and C. B. Houlder. June 24. 18087.

MANUFACTURE OF KETEN.—E. I. Du Pont de Nemours and Co. June 22. (United States, June 22, '32.) 17799.

PRESERVATION OF WOOD, ETC.—E. I. Du Pont de Nemours and Co. June 23. (United States, June 23, '32.) 17931.

MANUFACTURE OF EXPLOSIVE COMPOSITIONS.—E. I. Du Pont de Nemours and Co. June 24. (United States, June 24, '32.) 18076.

MANUFACTURE OF CELLULOSE ESTERS.—E. I. Du Pont de Nemours and Co. June 24. (United States, June 24, '32.) 18077.

MANUFACTURE OF LOW-BOILING HYDROCARBONS.—H. D. Elkington (Akt.-Ges. für Steinkohleverflüssegung und Steinkohleveredelung). June 19. 17480.

STABILISATION OF PEROXIDE SOLUTIONS.—J. R. Geigy Akt.-Ges. June 23. (Germany, June 23, '32.) 17929.

MAKING AMMONIUM SULPHATE NITRATE.—Gewerkschaft Victor. June 23. (Germany, June 23, '32.) 17029.

MANUFACTURE OF AZO DYESTUFFS INSOLUBLE IN WATER.—I. G. Farbenindustrie. June 19. (Germany, June 17, '32.) 17454.

MANUFACTURE OF AZO DYESTUFFS.—I. G. Farbenindustrie. June 20, 17592, June 21, 17688.

MANUFACTURE OF INSOLUBLE AZO DYESTUFFS ON THE FIBRE.—I. G. Farbenindustrie. June 22. (Germany, June 22, '32.) 17811.

MANUFACTURE OF ANTHRAQUINONE ACRIDONE DERIVATIVES.—I. G. Farbenindustrie. June 23. (Germany, June 25, '32.) 17972.

MANUFACTURE OF TRIARYLMETHANE DYESTUFFS.—I. G. Farbenindustrie. June 23. (Germany, June 25, '32.) 17973.

AZO DYESTUFFS.—Imperial Chemical Industries, Ltd., and F. L. Rose. June 23. 18007.

PRODUCTION OF POTASSIUM FORMATE.—R. Koepp & Co., Chemische Fabrik. June 23. 18022, 18023, 18024.

MANUFACTURE, ETC., OF SOLVENTS ETC., FOR CELLULOSE DERIVATIVES AND RESINS.—L. P. Kyrides. June 20. 17589, 17590.

MANUFACTURE OF PHENANTHRIDONE DERIVATIVES.—G. T. Morgan and L. P. Walls. June 20. 17573.

MANUFACTURE OF AROMATIC OXY-COMPOUNDS.—Dr. F. Raschig. June 19. (Germany, June 18, '32.) 17453.

MANUFACTURE OF PHENOL.—Dr. F. Raschig. June 20. (Germany, June 20, '32.) 17572.

MANUFACTURE OF SYNTHETIC CYCLIC COMPOUNDS.—T. van Schelven. June 21. 17657.

DECOLOURISING AND BLEACHING OILS, FATS, ETC.—T. Van Schelven. June 21. 17658.

PREPARATION OF CADMIUM SULPHIDE.—Verein Chemische Fabriken, Silesia. June 21. (Germany, July 5, '32.) 17723.

MANUFACTURE OF HYDROXY DICARBOXYLIC ACIDS.—Standard Brands, Inc. June 22. (United States, July 18, '32.) 17794.

PRODUCTION OF HIGHLY-ACETYLATED CELLULOSE ACETATES.—A. H. Stevens (Berl). June 23. 18013.

PREPARATION OF CYANOGEN COMPOUNDS.—M. I. Aische. July 1. 18688.

ALUMINIUM ALLOYS.—L. Aitchison and H. W. Clarke. June 29. 18555.

PREPARING PLASTIC MATERIALS DERIVED FROM UREA AND FORMALDEHYDE.—R. Armenault and Fabriques de Produits de Chemique Organique de Laire. June 29. 18508, 18509.

MANUFACTURE OF AROMATIC AMINES.—L. S. Bake, W. S. Calcott and E. I. Du Pont de Nemours and Co. June 27. 18285.

DISPERSING PIGMENTS IN CELLULOSE ESTER SOLUTIONS.—Brevolite Lacquer Co. July 1. (United States, July 14, '32.) 18727.

MANUFACTURE OF CELLULOSE DERIVATIVE PRODUCTS.—British Celanese, Ltd., W. A. Dickie and P. F. C. Sowter. June 27. 18280.

PRODUCTION OF CARBOHYDRATE COMPOUNDS.—H. Dreyfus. June 27. 18278.

MANUFACTURE AND TREATMENT OF CELLULOSE DERIVATIVES, ETC.—H. Dreyfus. June 27. 18279.

PRODUCTION OF COMPOSITIONS COMPRISING ORGANIC POLYSULPHIDE PLASTICS AND SYNTHETIC RESINS.—Dunlop Rubber Co., Ltd., A. E. T. Neale and D. F. Twiss. June 28. 18373.

MANUFACTURE OF COMPOUNDS OF THE BENZANTHRONE SERIES.—E. I. Du Pont de Nemours and Co. June 29. (United States, July 2, '32.) 18502.

WATER-SOLUBLE DIAZOIMINO COMPOUNDS.—E. I. Du Pont de Nemours and Co. June 30. (United States, July 27, '32.) 18638, 18639, 18640.

MANUFACTURE OF ANTHRAQUINONE DERIVATIVES.—E. I. Du Pont de Nemours and Co. July 1. (United States, July 2, '32.) 18737.

REACTING FATTY ACID AND ALKALI.—J. T. Freestone. June 28. 18349.

REGENERATION OF ALKALINE LIQUORS FOR ABSORPTION OF HYDROGEN SULPHIDE.—Gas Light and Coke Co., H. Hollings and W. K. Hutchison. July 1. 18732.

MANUFACTURE OF CHOLESTERIN ESTERS.—W. W. Groves (I. G. Farbenindustrie). June 27. 18304.

MANUFACTURE OF AZO DYESTUFFS INSOLUBLE IN WATER.—I. G. Farbenindustrie. June 26. (Germany, June 25, '32.) 18192, 18193.

MANUFACTURE OF 4:8-DIHYDROXY-1:2:5:6-DIBENZO-PHENAZINES.—I. G. Farbenindustrie. June 26. 18194, 18195.

ARTIFICIAL PRODUCTS MADE FROM POLYMERIC COLLOIDS.—I. G. Farbenindustrie. June 28. (Germany, July 2, '32.) 18415.

MANUFACTURE OF *ar*-OCTOHYDRO-2:2¹ DIHYDROXY-1:1¹ DINAPHTHYL, ETC.—I. G. Farbenindustrie. June 30. (Germany, June 30, '32.) 18621.

MANUFACTURE OF 6-BROMO (OR -CHLORO)- 2:4-DINITRANILINE.—I. G.Farbenindustrie. June 30. (Germany, July 2, '32.) 18623.

DYEING.—Imperial Chemical Industries, Ltd. June 26. 18147.

MONOAZO DYESTUFFS.—Imperial Chemical Industries, Ltd. June 26. 18148.

MANUFACTURE OF INTERMEDIATES AND DYES OF THE AZO SERIES.—Imperial Chemical Industries, Ltd. June 27. 18286.

DYES, AND THEIR APPLICATION.—Imperial Chemical Industries, Ltd., and M. Wyler. June 30. 18606.

LUBRICANTS, ETC.—J. Y. Johnson (I. G. Farbenindustrie). June 26. 18152.

MANUFACTURE OF AMINES.—J. Y. Johnson (I. G. Farbenindustrie). June 28. 18402.

MANUFACTURE OF ROT-PROOF CELLULOSE FIBRES, ETC.—J. Y. Johnson (I. G. Farbenindustrie). June 28. 18403.

MANUFACTURE OF SULPHURIC ACID.—Metallges. June 26. (Germany, Aug. 4, '32.) 18175.

MANUFACTURE OF ALCOHOLS FROM OLEFINES.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. June 26. (Holland, July 8, '32.) 18206.

DISTILLING FATTY ACIDS, ETC.—New Process Fat Refining Corporation. June 29. 18513, 18514, 181515.

MANUFACTURE OF INTERMEDIATES AND DYES OF THE AZO SERIES.—K. H. Saunders. June 27. 18286.

New Companies Registered

Sir William Burnett & Company (Chemicals), Ltd., 5 Arundel Street, Strand, W.C.2. Registered July 1. Nominal capital £1,000 in £1 shares. To acquire part of the undertaking of Sir William Burnett & Co. (Parent), Ltd., and to carry on the business of manufacturers of, and dealers in chemicals, soldering fluids, disinfectants, timber preservatives, lubricating and other oils, etc. A director: S. D. Churton, Birch Cottage, Ashley Road, Walton-on-Thames.

R. & J. Garroway, Ltd. Registered in Edinburgh on June 30. Nominal capital £50,000 in £1 shares. Manufacturers of chemicals, fertilisers, feeding stuffs, etc. A director: G. T. McLeod, 694 Duke Street, Glasgow, chemical manufacturer.

Books Received

Directory of British Fine Chemicals produced by Members of the Association of British Chemical Manufacturers, London. Pp. 64.

Society of Chemical Industry. Chemical Engineering Group Proceedings. Vols. 13 and 14. 1931 and 1932. London: Chemical Engineering Group. Pp. 178 and 184. 10s. 6d. each.

The Chemistry and Physics of Clays and other Ceramic Materials. By Alfred B. Searle. London: Ernest Benn, Ltd. Pp. 738. 55s.

Industrial Chemistry. By William Thornton Read. London: Chapman and Hall, Ltd. Pp. 576. 31s.

Essai sur la Chimie Comparée. By Ionel N. Longinescu. Paris: Les Presses Universitaires de France. Pp. 98.

Handbook of Mathematical Tables and Formulas. Compiled by Richard Stevens Burington, Ph.D. Ohio: Handbook Publishers, Inc. Pp. 251. $2.00.

Science Progress. July, 1933. London: Edward Arnold & Co., Pp. 192. 7s. 6d.

F.B.I. Register of British Manufacturers. 1933-34. London: Federation of British Industries. Pp. 516.

Official Publications

Imperial Institute. Annual Report 1932 by the Director, Lt.-Gen. Sir William Furse. Pp. 52. 2s.

Economic and Trade Conditions in Australia, to December, 1932. Report compiled by A. W. Burton. Department of Overseas Trade. London: H.M. Stationery Office. Pp. 160. 4s. 6d.

Economic Conditions in Czechoslovakia, March, 1933. Report by H. Kershaw. Department of Overseas Trade. London: H.M. Stationery Office. Pp. 61. 2s.

Memorandum on Restrictions on Foreign Exchange Transactions. London: Department of Overseas Trade. Pp. 20. Ref. No. C.4149.

69th Annual Report on Alkali, etc. Works. By the Chief Inspectors. Proceedings during the year 1932. London: H.M. Stationery Office. Pp. 46. 9d.

Canning Equipment

Use of Chromium Steels

THE corrosion problem encountered in the food canning industry is peculiar in that contamination of the food caused by its own corrosive action, rather than the attack on the machinery, is the important factor. For this reason extreme care must be exercised in selecting the proper material of construction. The subject is dealt with in an article in a recent issue of "Oxy-Acetylene Tips." The food acids encountered in canning will attack many metals and alloys, resulting in a metallic taste, or other undesirable change in the product. Many metals have been tried, including copper, tin, aluminium, nickel and Monel metal, and galvanised iron. However, with the development of the stainless steels of the straight chromium and chromium-nickel types, a metal has been found which is more suitable for most kinds of canning equipment. The so-called straight chromium steels, containing from 12 to 18 per cent. chromium, are highly resistant to milk, fruit and vegetable juices, meat products, sugar solutions, chocolate, vinegar at high temperatures, and vegetable and animal oils. The stainless steels of the 18-8 chrome-nickel variety are also resistant to all these food products as well as other highly corrosive substances. These alloy steels are also unaffected by the cleansing and sterilising agents. These highly desirable chemical properties, together with excellent physical characteristics and comparative ease of manufacture, have resulted in extensive use of the stainless steels in all branches of the food industry. These steels are readily welded by the oxy-acetylene process, an important feature in food handling machinery. Welded joints, ground smooth and polished, make possible the cleanest, most sanitary type of equipment as well as the most pleasing in appearance. Since both cleanliness and appearance are vital factors in canning apparatus, the ready adaptability of the stainless steels to oxwelding has been a contributing factor to their extensive use in this field.

From Week to Week

An index to volume xxviii of The Chemical Age is published with this issue. It will be found inside the back cover, whence it can readily be detached for binding purposes.

The price of neutral sulphate of ammonia for delivery July/August is announced at £6 15s. per ton for 6-ton lots carriage paid buyers' nearest station.

Dr. Frank Briers, chemistry master at Roundhay School, Leeds, has been appointed lecturer in chemistry at the Wigan and District Mining and Technical College, where he will begin duty in September.

Recent wills include :—Mr. Charles McNab, retired calico printer, Stirling, £14,601; Mr. H. J. R. Pamphilon, Congleton, managing director of the North Staffordshire Pulveriser Company, £12,882.

The Treasury has made an Order under Section 10 (5) of the Finance Act, 1926, exempting ethyl cellulose and methyl cellulose from key industry duty from July 7, 1933, to December 31, 1933. The Treasury Order will shortly be published by H.M. Stationery Office.

A ballot of the workers of the North British Rubber Co., who were involved in the strike which led to the mills being closed last week, resulted in favour of a resumption of work on the modified conditions put forward by the management. The cause of the strike, which affected more than 3,000 workers, was the introduction of a time bonus system as an experiment in several of the departments.

For exceeding the speed limit with a motor van, containing a load of 4,000 lb. of T.N.T., Durrant Ions, motor driver of Stockton-on-Tees, was fined £5 at Doncaster on July 3. Summonses against his employers, A. G. Allen, chemical manufacturer, and H. Glenwright, manager, for aiding and abetting, were dismissed. The case was reported in The Chemical Age of May 6, when the magistrates adjourned the summonses.

The Textile Institute (Yorkshire Section) has elected the following officers :—Chairman, Mr. T. H. Robinson (Bradford); vice-chairman, Mr. A. Bailey (Halifax); hon. secretary, Mr. W. Garner; assistant hon. secretary, Mr. H. S. Newsome; committee (to serve for two years), Messrs. J. Dumville, N. H. Chamberlain, J. H. Healey, H. Richardson, A. Saville, A. Frobisher, E. E. Cockroft, W. Morley, T. H. Robinson and H. Turner.

The recently rebuilt soap factory of James Cowan and Co., Ltd., at Irvine, was formally declared open by Mr. J. E. Shaw, County Clerk of Ayr. The factory was destroyed by fire in November last year, since when it has been rebuilt and considerably enlarged, while the latest machinery for the manufacture of soap has been installed. There was a company of about 100 visitors from all parts of the West of Scotland at the ceremony.

To celebrate the centenary of David Moseley and Sons, Ltd., a portion of Belle Vue, Manchester, has been booked for July 22 from 2 p.m. onwards, and the directors, shareholders, staff and workpeople have been invited to attend. The celebrations will include sports, dinner, prize presentation, speeches, dancing, and fireworks. This matter will be of considerable interest to the industry in view of the fact that Moseleys were the originators of many of the products which are used in technical processes to-day.

A dinner was given by the directors of Imperial Chemical Industries, Ltd., on the occasion of the meeting of the Association of Technical Institutions in Manchester on June 29. The toast of the Association was proposed by Mr. C. J. T. Cronshaw, who presided. In reply, Principal P. J. Kitchen, the chairman of the council of the Association, said that in the coming years technical education had the task of evolving a culture which would place all workers in a place of dignity. In the past its work had not been taken sufficiently seriously in this country either by the educational profession or by industry; but, in view of the numbers of children over the age of 14 who were at present getting no serious educational training, and were not connected with any social institution, it was evident that its part in the future might be of great importance.

The London School of Hygiene and Tropical Medicine will hold the next series of lectures and demonstrations on tropical hygiene, which are intended for men and women outside the medical profession proceeding to the tropics, from July 10 to 19. The eight lectures will be given by Lt.-Colonel G. E. F. Stammers, M.R.C.S., L.R.C.P. These courses of instruction, in addition to providing simple rules for guidance in regard to personal hygiene and preparation for life in the tropics, will also embrace a short account of some of the more common diseases, with advice in regard to measures of protection and self-treatment. The synopsis and other particulars can be obtained from the Secretary, London School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, W.C.1.

Two Dalton Chemical Scholarships awarded by the Manchester University have been divided between G. Gee, G. Ogden and L. J. L. Tuck.

Trinidad Leaseholds, Ltd., are to establish an oil depot at Penarth (Glam.) Harbour. This will be one of six big distributing centres the company has decided to set up in Great Britain.

Mr. John A. Cocking, of Manchester, has been appointed northern representative for the mechanicals department of Redfern's Rubber Works, Ltd., of Hyde, Cheshire. He commenced his duties on July 3.

Mr. W. Cowen, of Billingham, and a member of the staff of Imperial Chemical Industries, Ltd., has been appointed lecturer in chemical engineering in the University of Manchester at the College of Technology.

In the House of Lords, on June 29, on the motion to go into committee on the University Spurious Degrees (Prohibition of Use and Issue) Bill, Lord Jessel said considerable objection has been taken to the measure as drafted. The Bill was withdrawn and a new Bill introduced and read a first time.

Large consignments of manufactured dyes of the German Dye Trust, lying ready for shipment in the stores houses of the trust at Höchst, on the Main, were destroyed by a fire which burned for five hours on July 4. Explosion followed upon explosion and clouds of smoke in varied colours obscured the sky for some hours. The damage is considerable, but production, it is stated, will not be interrupted.

Cork Fire Brigade battled for three and a half hours on June 29 to save the main building at the works of Harrington, Goodlass, Wall, Ltd., Commons Road, Cork, Ireland. The firm makes large supplies of chemicals, varnishes, etc., and the paints shed, fifty yards long, in which were stored chemicals and highly inflammable materials for making paints and varnishes, took fire at midnight.

Formal notice was given in the "London Gazette" of July 4 of the voluntary winding up of the Hallivet China Clay Co., Ltd., Burthy China Clays, Ltd., Imperial Goonbarrow Clays, Ltd., the Great Halviggan China Clay Co., Ltd., Rosevear Clays, Ltd., the North Goonbarrow China Clay Co., Ltd., the Carbis China Clay and Brick Co., Ltd., and the New Halwyn China Clay Co., Ltd. In each case Mr. D. H. Allan, of 4 Fenchurch Avenue, London, has been appointed liquidator, and all debts have been or will be paid in full.

An Order-in-Council entitled the Merchandise Marks (Imported Goods) No. 12 Order, 1933, made on June 26, under Section 2 of the Merchandise Marks Act, 1926, requires imported goods of the following descriptions to bear an indication of origin on sale or exposure for sale in the United Kingdom :—(a) Pencils consisting of strips made wholly or partly of graphite, carbon, chalk, gypsum, talc, colours or dyestuffs, encased in wood, paper, or other materials, but not including propelling pencils; (b) pencil strips of these descriptions, including those for propelling and other mechanical pencils.

Vision in Industry is the subject of a pamphlet issued by The National Ophthalmic Treatment Board (Industrial Section) stressing the importance of good eyesight for those employed in the factories of various industries. To meet the requirements of industry, the board, with the approval and support of the British Medical Association has prepared a scheme for the expert examination of the eyes of workers. The board has arranged centres throughout the country with approved medical personnel and also for the supply by approved opticians of the glasses that may be prescribed on a definite scale of reasonable inclusive charges. Inquiries with regard to this service should be addressed to The General Secretary, National Ophthalmic Treatment Board ,Industrial Section), 1 High Street, Marylebone, London, W.1.

The opening of the World Petroleum Congress will be preceded by a reception of delegates and members by Mr. T. Dewhurst, A.R.C.S., F.G.S., president of the Institution of Petroleum Technologists, at the Science Museum, South Kensington, on the evening of July 19. The British Government will hold an official reception of delegates and members at 10 p.m. on July 20. In addition to the series of visits to various works there will be additional visits arranged for Wednesday, July 26, the day after the official closing of the congress. As a relaxation from the more serious side of the congress, an excursion has been arranged for Sunday, July 23, when members and guests will leave London by motor coaches for a visit to Virginia Water, Windsor, and other places of picturesque beauty and interest in the neighbourhood, followed by luncheon at Great Fosters. The journey will then be continued from Staines by launch to Hampton Court, where the palace and gardens will be visited, after which the party will return to London by road.

THE IMPORT DUTIES ADVISORY COMMITTEE has received an application for drawback under Section 9 of the Finance Act, 1932, in the case of refined fish and marine animal oils in respect of the crude fish and marine animal oils used in their manufacture. Representations should be addressed in writing to the Secretary, Import Duties Advisory Committee, Caxton House (West Block), Tothill Street, Westminster, London, S.W.1, not later than July 27, 1933.

ELEVEN STUDENTSHIPS are included in the post-graduate awards at Armstrong College (University of Durham), Newcastle. Mr. Harold M. Glass received a Pemberton Studentship and intends to continue his work on organic substances and physical chemistry at the college. Mr. Thomas Holmes, who has worked on the hydrocarbons produced in the distillation of rubber, under Professor G. R. Clemo, has received a College Post-Graduate Studentship, and intends to continue this work.

Company News

J. Mandleberg & Co., Ltd.—The directors announce that payment of the preference dividend has been postponed until the accounts for the year to December 19, 1933, are available.

Cyprus Sulphur and Copper Co.—The report for 1932 states that the accounts show a loss of £2,699, increasing the debit brought in to £8,063.

Broughton Copper Co.—The year to March 31 last resulted in a loss of £19,693 which is carried forward. The balance of £75,716 at debit of profit and loss account at March 31, 1932, was written off out of capital and reserves in accordance with the capital reorganisation scheme. The annual meeting will be held at Blackfriars House, Manchester, on July 14, at 12 noon.

Amalgamated Zinc (de Bavay's).—The income for the half-year amounted to £6,159, consisting of £4,401 interest earned, etc., and £1,758 dividends received on shares in other companies. After deducting £602 for workers' compensation, £420 provision for tax, also the usual administrative charges, the net profit was £3,725, which, with £1,275 from equalisation reserve, leaves £5,000 at credit of appropriation account. Since the close of the period £1,381 has been received from dividends on shares in other companies, and a dividend of 2½ per cent. was paid on April 7.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Australia.—A consulting engineer desires to secure the representation, on a basis to be arranged, of United Kingdom manufacturers of steam packings for the New South Wales industrial areas. (Ref. No. 2.)

Austria.—An agent established at Vienna wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers and exporters of raw rubber, asbestos, linen tyre fabric, cocoa beans. (Ref. No. 8.)

British India.—The British Trade Commissioner at Calcutta reports that the Indian Stores Department is calling for tenders (Tender No. M.3227), to be presented in Simla by July 24, 1933, for the supply of creosote for treating soft wood sleepers. (Ref. F.Y. 1799.)

Portugal.—An agent established at Oporto wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of aniline dyes and industrial chemicals especially for the textile trades, for the Oporto district. (Ref. No. 24.)